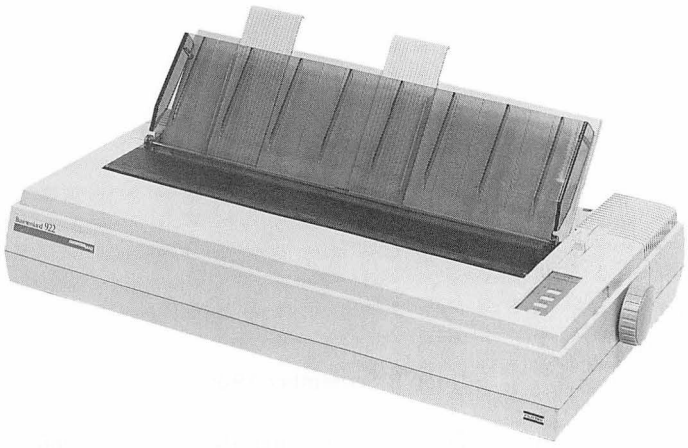
Businessland 922 Printer User's Manual

136-Column Monochrome and Color Printer Epson FX-100 Command Type



BUSINESSLAND®

Edition B September 1986

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**** PREFACE ****

This Manual represents your printer as manufactured at the time of publication. Every effort has been made to ensure that information in this Manual is complete and accurate. We reviewed this Manual but cannot be held responsible for errors and omissions.

We also publish a Maintenance Manual and a Parts Catalog for this printer. Please request additional publications from your dealer.

We reserve the right to make changes and improvements to this product without obligation to incorporate these changes and improvements into units previously shipped.

***** TRADEMARK ACKNOWLEDGEMENT *****

Centronics is a trademark of Centronics Data Computer Corp
FX-80 and JX-80 are trademarks of Epson Corp
Microsoft BASIC is a trademark of Microsoft Corp
BDT is a trademark of Büro und Datentechnick GmbH

**** SUPPLIES, OPTIONS AND PUBLICATIONS ****

The following items are available for your printer. Contact your Dealer/Distributor or Fujitsu representative for additional information.

SUPPLIES:

Ribbon Cassettes

Color (D30L-9001-0401)
Monochrome (D30L-2014-0096)

Print Head Mechanism

(D86B-1127-C151)

OPTIONS:

Cut Sheet Feeders

Single Bin for the 80-column Printer
(ASF300-FJ2101)
Single Bin for the 136-column Printer
(ASF300-FJ2201)

Color Kit

Color Kit Assembly (D86B-1144-D001)

Interface Circuit Boards

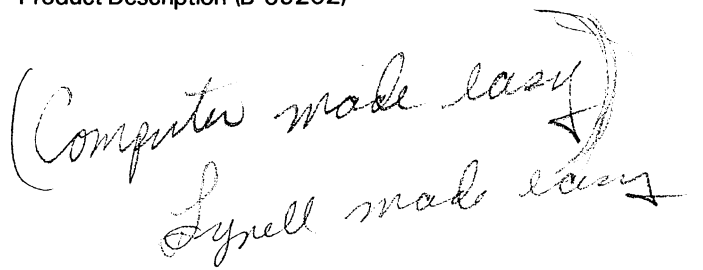
Parallel Interface (D86B-1144-C011)
RS-232C Serial Interface (D86B-1144-C021)

Memory Circuit Boards

16K RAM Memory Board (D05B-2790-C001)
8K RAM Memory Board (D05B-2790-C002)

PUBLICATIONS:

Programmer's Manual (B-69191)
Maintenance Manual (B-69198)
Parts Catalog (B-69199)
Schematic Drawings (B-69201)
Product Description (B-69202)



***** STANDARD FEATURES *****

Thank you for purchasing this high quality printer. You have made a wise selection. Your printer will provide years of high speed, reliable, and versatile printing.

Your new printer has been designed to satisfy most word processing, data processing, and graphic printing requirements when interfaced to a small or medium sized host system.

Features found in your printer are listed in the following Table of Features.

TABLE OF FEATURES

HIGH SPEED & QUIET PRINTING

Up to 220 characters per second with automatic bidirectional printing logic and 4 inches of line feeds per second saves printing time and increases productivity. Printing noise is less than 55 dB.

NEAR LETTER QUALITY

Print characters consist of 19 horizontal and 16 vertical dots in Near Letter Quality (NLQ) mode.

COLOR OR MONOCHROME PRINTING

Color printing is achieved when the optional color kit and a four-color ribbon cassette are installed.

PAPER HANDLING

Load paper with the Auto Load function for both cut paper and continuous forms with the 80-column printer, and with the 136-column printer for cut paper within the Auto Load range. A change from continuous forms to cut paper is achieved easily without removing the continuous forms. An optional single bin cut sheet feeder is also available.

OUTSTANDING RELIABILITY

A simplified print mechanism results in outstanding reliability and ease of maintenance.

CHARACTER SETS & GRAPHICS

Select an Epson JX-80 (or FX-80) character set. Character sets are shown in **Appendix G**.

CHARACTER SPACING

Characters per inch (CPI) may be 10, 12, 15, 17.1, 20, proportional, or programmed in increments of 1/120".

LINE SPACING

Line spacing is selected by a command (1/6, 1/8, 7/72, n/72, n/216).

SERIAL & PARALLEL INTERFACES

An RS-232C Serial or Centronics Type Parallel Interface Circuit Board allows easy interfacing to your host system.

EXCHANGEABLE MEMORY BOARDS

Memory Circuit Boards are available with an optional 8K or 16K bytes of additional RAM. Input Buffer is 8K or 16K bytes with the 136-column printer and 10K or 18K with the 80-column printer.

***** APPLICATION SOFTWARE SET UP *****

Don't be alarmed if your printer is missing from the list of printer options in the installation instructions for your application software.

Simply instruct your software package that it is working with an Epson FX-80 printer and your printer will perform as specified.

The Tables of Commands in **Section 5** are included for programmers developing custom software packages. A Programmer's Manual is also available.

***** PURPOSE OF MANUAL *****

This Manual is designed to help you install, set up, and use your printer. Our goal is to explain the many features of your printer in a clear, easy to understand manner.

This series includes the 80-column printer and 136-column printer. The 80-column printer has an 8 inch print line and the 136-column printer has a 13.6 inch print line. Except for print line length and minor differences in paper handling, the printers are identical. The material in this manual applies to both versions unless otherwise noted.

This manual is written for both the novice and the experienced user. We have included procedures, tables and illustrations. Summary information is given in concise terms and you will find a reference to additional detail where applicable.

This Manual is organized to present information in the order that it is most likely to be required. You will also find the Table of Contents helpful when you are trying to locate a particular procedure or specific information.

***** QUICK START CHART *****

Your printer is user friendly. Still you'll find it easier to master if you take just a few moments to review this Manual completely before you try to connect and use your printer.

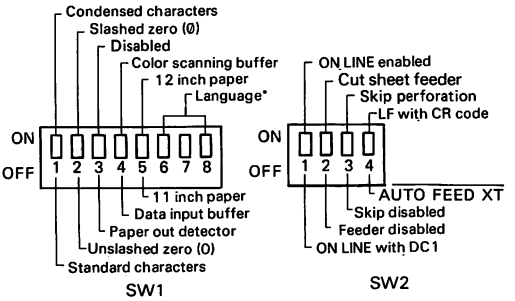
You may be tempted to connect your printer and learn how to use its many features as you gain experience. You may also be tempted to leave this Manual on a shelf and read it only in an emergency. Please resist these temptations.

The following Quick Start Chart is a summary of the steps we recommend you follow to set up and operate your printer.

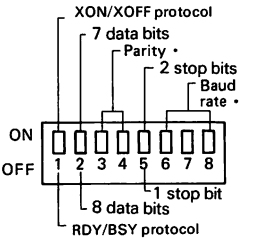
QUICK START CHART

What You Do:	What You Check:	Refer To:
Unpack Printer	Received items	Page 1-2
Open front cover & remove shipping restraints	Print carriage for smooth side to side movement	Page 1-4
Install Memory & Interface Boards	Installation instructions	Page 1-8 and B-1
Prepare printer for host operations	DIP switch settings shown below	Page 1-11

DIP Switches on Memory Circuit Board



DIP Switches on RS-232 Interface Circuit Board



*Language, Baud Rate and Parity — Switch Details

*Language	U.S.A.	French	German	English	Danish	Swedish	Italian	Spanish
ON / OFF	6 7 8							
Baud rate	—	9600	4800	2400	1200	600	300	200

Parity	Even	Odd	None	None
ON / OFF	3 4			

The Quick Start Chart is continued on the next page.

QUICK START CHART
(Continued)

What You Do:	What You Check:	Refer To:
Install Color Kit (if ordered)	Installation instructions	Page A-1
Install ribbon cassette	Ribbon path between print head and platen	Page 2-8
Attach AC cord	Ensure voltage is OK	Page 1-15
Insert paper	Paper width/position	Page 2-14 or 2-21
Run Self-Test	Printer performance	Page 1-16
Connect interface cable	Type of interface & cable connection	Page 1-17
Use your printer with your host system and check the printer's performance.		
Refer to Section 4 for printer Troubleshooting hints. Refer to computer documentation for system faults.		

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SECTION 1
INSTALLATION AND SELF-TEST

1.1 UNPACK THE PRINTER

Follow the unpacking instructions on the shipping carton. See **Figure 1-1**.

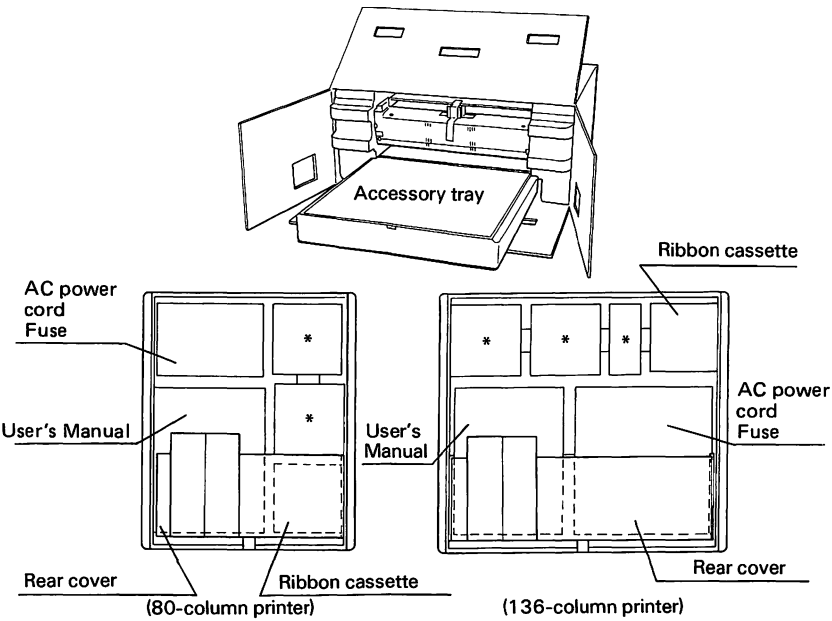
Remove the items from the accessory tray.

> **NOTE:**
> You will find the Color Kit and an Interface Circuit Board in the shipping carton, only if they were ordered with your printer.

Open the printer's soundproof, front, and top covers, by lifting the soundproof and front covers and then pulling the cover assembly upward.

If shipping damage is noticed, immediately notify your dealer/distributor or shipping agent.

Keep all shipping material for reshipment or storage of the printer.

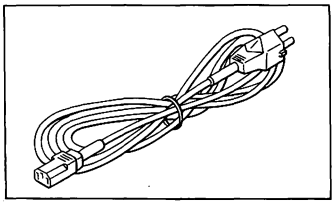


Note: Spaces with * are for the options.
Manual is placed on the left side.
Place the instructions to remove the ribbon stop beneath the ribbon cassette.

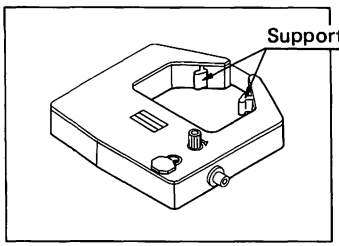
Figure 1-1 Opened Shipping Carton and Accessory Tray Layout

1.2 CHECK ITEMS RECEIVED

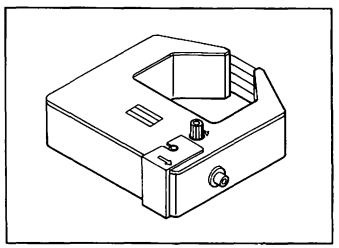
Items normally shipped with each printer are shown below. Circuit Boards may be already set on a printer.



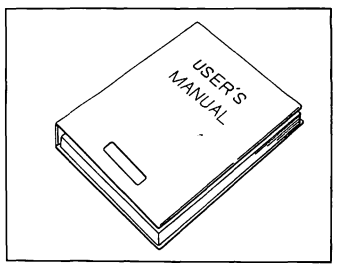
AC Power Cord



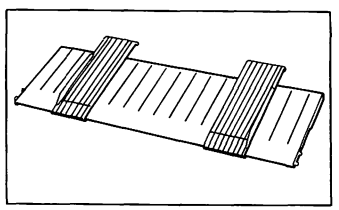
Monochrome Ribbon Cassette
(Support tabs are only on monochrome ribbon cassette)



Color Ribbon Cassette

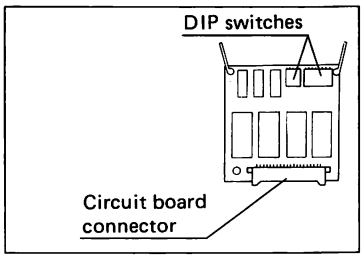


User's Manual

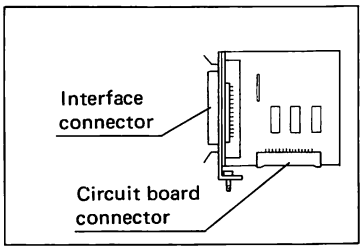


Rear Cover

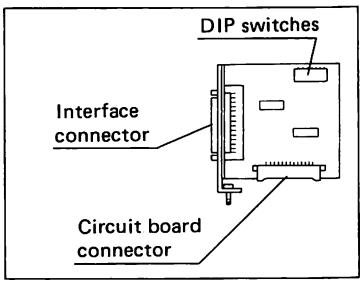
Figure 1-2 Items Shipped With Printer (1 of 2)



Memory Circuit Board



Parallel Interface Circuit Board



Serial Interface Circuit Board

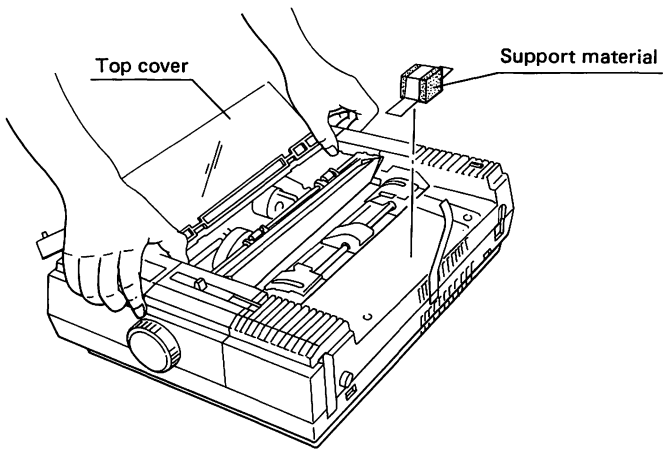
Figure 1-2 Items Shipped With Printer (Continued)

1.3 SHIPPING RESTRAINTS

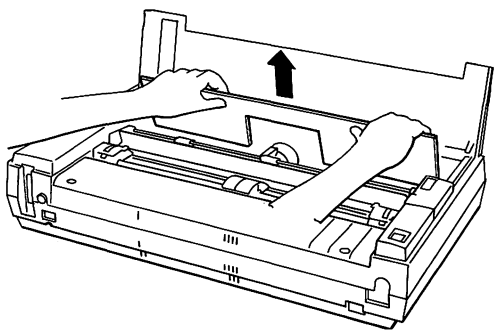
Refer to **Figure 1-3**.

Open the soundproof, front and top covers and remove the shipping restraint by lifting it out of the printer.

Slide the print head from side to side, along the print line. The print head must be able to move without binding to allow the printer to operate correctly.



Open the Soundproof, Front and Top Covers



Remove the Shipping Restraint

Figure 1-3 Shipping Restraint Removal

1.4 INSTALLATION PRECAUTIONS

Install your printer on a level surface to avoid excess vibrations.

Do not install your printer in a location where it may become overheated. Avoid locations in direct sunlight and near heaters.

Do not block the ventilation around your printer.

Use a power outlet that is not shared with industrial equipment that may generate electrical noise.

Use only the proper AC voltage.

1.5 PRINTER ELEMENTS

Refer to **Figure 1-4**. Major printer elements are:

1) Top Cover — raise for access into printer for ribbon installation, paper thickness adjustment and other operator activities.

2) Paper Thickness Lever — move this lever to change the gap between the print head and the platen.

3) Bail Roller Unit — holds the paper against the platen.

4) Power Switch — initializes the printer and lights the power lamp when turned ON.

5) Rear Cover — use to load cut sheets of paper and guide continuous forms. Take out Rear Cover from the accessory tray and attach it to the printer. Use Guides to position cut sheets of paper.

6) Platen — supports the paper when printing.

7) Forms Tractor — holds and feeds continuous forms (can be seen with the Rear Cover raised or removed).

8) Card Cover — remove for access to the Interface and Memory Circuit Boards.

9) Paper Release Lever — sets friction (Cut Sheet) or tractor (Continuous Form) paper feed mode.

10) Platen Knob — used to manually feed paper.

11) Operator Panel — used by the operator for manual control of the printer. Indicates the present condition of the printer. The panel is shown and explained in **Section 2**.

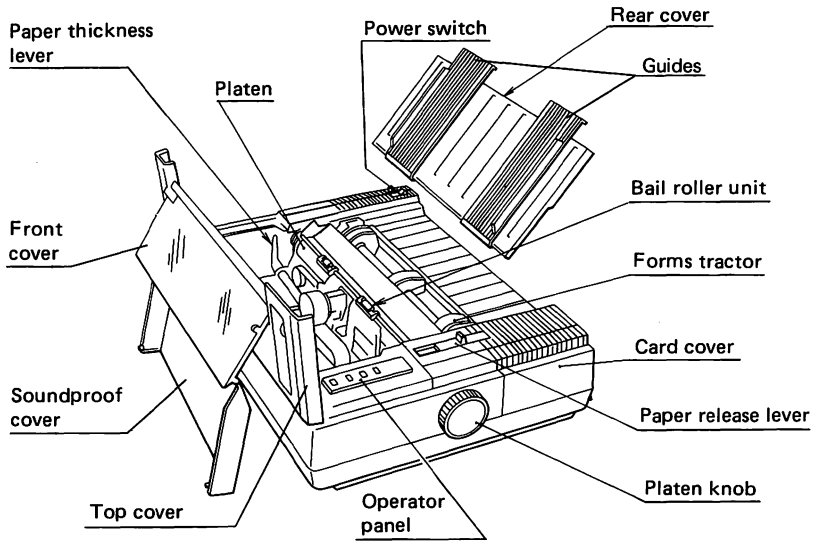


Figure 1-4 Major Printer Elements

1.6 REAR VIEW OF PRINTER

Figure 1-5 identifies the components on the rear of the printer.

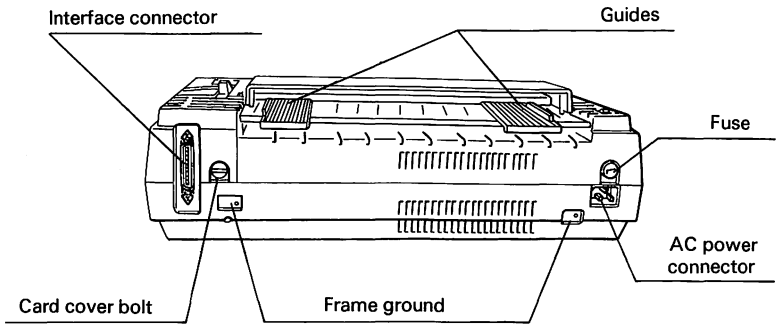


Figure 1-5 Rear View of Printer

1.7 INTERFACE AND MEMORY CIRCUIT BOARDS

The printer is designed to allow the user to install the required Interface and Memory Circuit Boards as a part of the installation process. These circuit boards establish the printer's interface (as Serial or Parallel), printer characteristics and the amount of optional RAM storage.

The Interface Circuit Board contains either the serial or parallel interface circuits and the interface cable connector (at the rear of the printer).

A Serial Interface Circuit Board contains DIP switches, associated with serial interface options, and allows a serial interface cable to be fastened with two screws as explained in **Appendix F**.

A Parallel Interface Circuit Board allows a parallel interface cable to be fastened with clips as explained in **Appendix E** (there are no DIP switches on the Parallel Interface Circuit Board).

The Memory Circuit Board contains control circuits, that establish printer characteristics, and DIP switches that are set by the user to establish default print parameters. Optional RAM memory is also installed on the Memory Circuit Board.

A summary of DIP switch functions is presented in paragraph 1-8. **Section 3** explains these DIP switch functions in greater detail.

Circuit board installation/exchange instructions are summarized in this paragraph and explained in **Appendix B**.

Refer to **Figure 1-6**. The Interface and Memory Circuit Boards are mounted beneath the Card Cover.

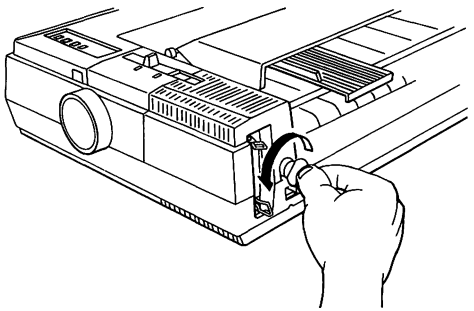
Remove the Card Cover to install the circuit boards, gain access to the circuit boards, to set the DIP switches, or install/exchange a circuit board.

CAUTION
Make sure your computer and printer are turned OFF before installing or removing a circuit board.

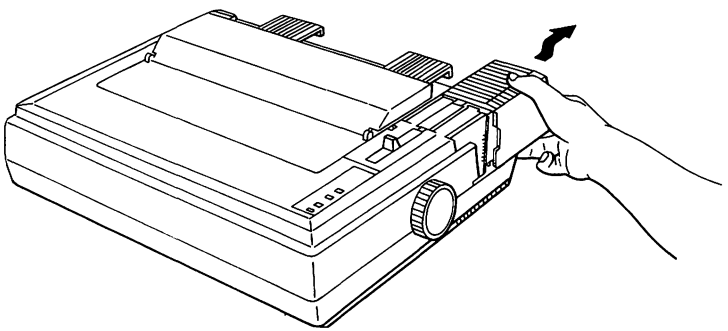
Place the Paper Release Lever towards the front of the printer (Cut Sheet position).

Loosen the Card Cover bolt in the back of the Card Cover using a coin or a screw driver (–).

Slide the Card Cover rearward (off the printer), lift it upward and remove it.



Loosen the Bolt



Remove the Card Cover

Figure 1-6 Access to Circuit Boards & DIP Switches

Refer to **Figures 1-7** and **1-8**.

Install the Memory Circuit Board in the innermost connector, by carefully aligning the connectors along the guide slots and then pressing the board into place.

Install the desired interface circuit board in the outermost connector, by carefully aligning the connectors along the guide slots and then pressing the board into place. Tighten the screw on the interface board, to ensure a good ground connection for the circuits.

1.8 SUMMARY OF DIP SWITCH SETTINGS

See **Section 3** for a complete description of DIP switch settings. Refer to **Figure 1-7** for the DIP switches installed on the Memory Circuit Board.

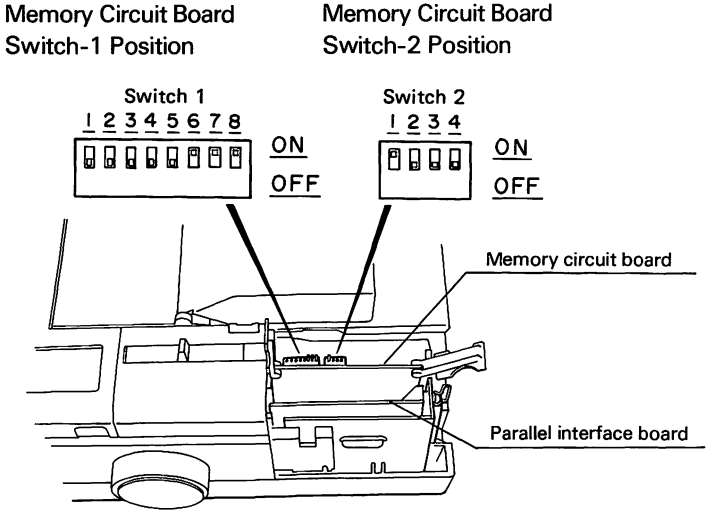


Figure 1-7 Memory Circuit Board DIP Switches (Factory Setting)

Table 1-1 shows functions selected by DIP Switch-1 on the Memory Circuit Board.

Table 1-1 DIP Switch-1 Functions

#	Function when OFF	Function when ON
1	*Standard Characters	Condensed Characters
2	*Unslashed 0	Slashed Ø
3	*Paper Out Detect	No Paper Out Detect
4	*Data Input Buffer	Color Scanning Buffer
5	*11" Paper Selected	12" Paper Selected
6	See Table 1-3	*See Table 1-3
7	See Table 1-3	*See Table 1-3
8	See Table 1-3	*See Table 1-3

* = Factory and most common setting.

Table 1-2 shows functions selected by DIP switch-2 on the Memory Circuit Board.

Table 1-2 DIP Switch-2 Functions

#	Function when OFF	Function when ON
1	ON-Line when $\overline{\text{SLCT IN}}$ is low ON-Line with DC1 when $\overline{\text{SLCT IN}}$ is high	*ON-Line with power On
2	*No Cut Sheet Feeder	Cut Sheet Feeder
3	*Print on Perforation	Skip over Perforation
4	*LF with $\overline{\text{AUTO FEED XT}}$ is low No LF when $\overline{\text{AUTO FEED XT}}$ is high	LF with CR

* = Factory and most common setting.

DIP Switch-1 on the Memory Circuit Board, positions #6, #7 and #8, select language unique symbols as shown in **Table 1-3**.

Table 1-3 Language Selection DIP Switch-1 #6, #7, and #8

Selected Language	Switch Setting		
	#6	#7	#8
U.S.A.	*ON	*ON	*ON
French	ON	ON	OFF
German	ON	OFF	ON
English	ON	OFF	OFF
Danish	OFF	ON	ON
Swedish	OFF	ON	OFF
Italian	OFF	OFF	ON
Spanish	OFF	OFF	OFF

* = Factory setting.

Refer to **Figure 1-8** for DIP switches installed on the Serial Interface Circuit Board.

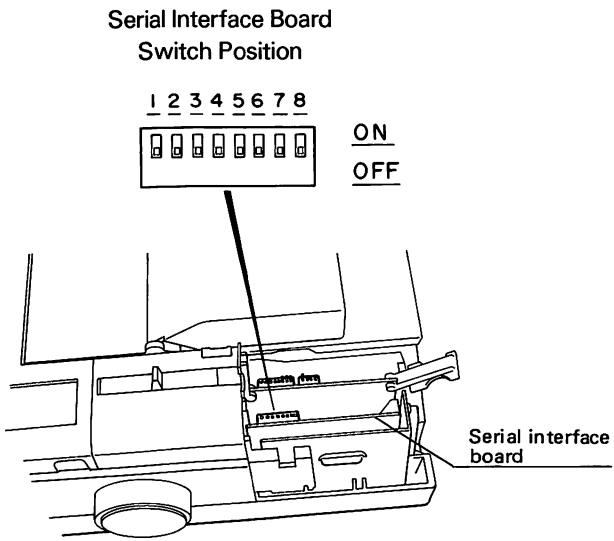


Figure 1-8 Serial Interface DIP Switches (Factory Setting)

Table 1-4 shows the functions selected by the DIP switches on the Serial Interface Circuit Board.

Table 1-4 Serial Interface Circuit Board DIP Switch Functions

#	Function when OFF	Function when ON
1	*PRT RDY/BUSY Protocol	XON/XOFF Protocol
2	*8-Bit Data Length	7-Bit Data Length
3	*Parity OFF	Parity ON
4	*Parity ODD	Parity EVEN
5	*1-Stop bit	2-Stop bits
6	*See Baud Rate Table 1-5	See Table 1-5
7	*See Baud Rate Table 1-5	See Table 1-5
8	*See Baud Rate Table 1-5	See Table 1-5

* = Factory and most common setting.

Table 1-5 shows DIP switch positions #6, #7 and #8 on the Serial Interface Circuit Board, used to select a Baud Rate that is compatible with the host system.

Table 1-5 Baud Rate Selection Serial Interface Circuit Board DIP Switch #6, #7, and #8

Selected Language	Switch Setting		
	#6	#7	#8
Undefined	ON	ON	ON
9600	ON	ON	OFF
4800	ON	OFF	ON
2400	ON	OFF	OFF
1200	OFF	ON	ON
600	OFF	ON	OFF
300	OFF	OFF	ON
200	*OFF	*OFF	*OFF

* = Factory setting.

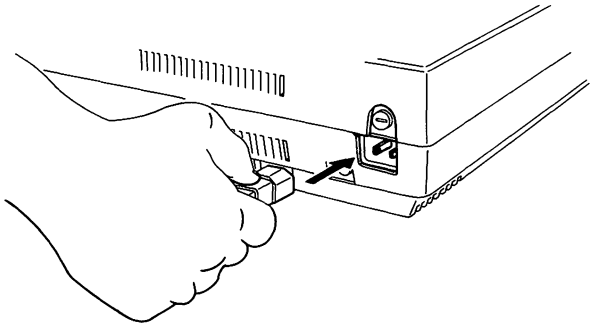
1.9 ATTACH THE AC POWER CORD

Refer to **Figure 1-9**.

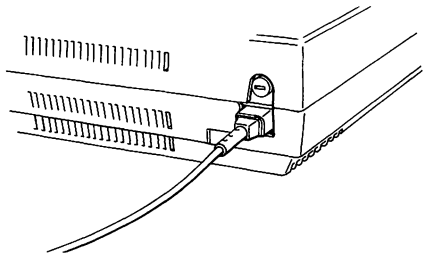
Your printer normally operates from any standard wall outlet (115-120 Volts AC or 220-240 Volts AC). The required power is printed on the printer's nameplate on the rear of your printer (see **Figure 1-5**). Carefully check the power requirements for your printer before attaching the AC cord and turning power ON.

For safety reasons ensure that the ground pin in the power cord is connected to electrical ground in your power outlet.

Do not turn on the power switch (to run Self-Test) until paper and a ribbon cassette are installed.



Align the Power Cord



Correctly Installed Power Cord

Figure 1-9 Attaching the AC Power Cord

1.10 SELF-TEST

Before running Self-Test, ensure that paper and a ribbon cassette are installed. See **Section 2** for paper loading and ribbon cassette installation instructions.

Check for a normal printer initialization cycle by turning the Power Switch OFF and then ON, before starting Self-Test.

During a normal printer initialization cycle, when power is turned ON:

The power lamp lights.

If the print head is on the left side, it moves toward the center of the print line and then back to the left side. Otherwise it moves only to the left side.

The On-Line lamp lights (if paper is inserted).

See the Troubleshooting hints, in **Section 4**, if you have different results.

Start the Self-Test print pattern as follows:

We recommend that you use continuous forms (more than 9" wide for the 80-column printer and more than 15" wide for the 136-column printer). The Self-Test prints the maximum characters per print line and if printing occurs off the paper the print head and Platen may be damaged.

Load paper into the printer (refer to paragraphs 2.6 and 2.7) and then turn power OFF.

While pressing the LF (Line Feed) switch (on the Operator Panel) turn power ON — continue pressing the LF switch until the initialization cycle is complete and Self-Test printing starts.

Release the LF switch when Self-Test printing starts.

Self-Test continues until power is turned OFF.

The Self-Test print-out consists of repeated printing, and character stepping, of the character set selected by the DIP switch settings.

If the color option is installed, each color is repeated after seven (7) lines of print.

We suggest you retain a copy of the Self-Test print pattern for reference.

Figure 1-10 Self-Test Print Pattern

1.11 CONNECTING AN INTERFACE CABLE

Refer to your system documentation to determine the type of interface required for your system.

A 36-pin interface cable receptacle will be exposed at the rear of your printer when a Parallel Interface Circuit Board is installed.

A 25-pin interface cable receptacle will be exposed at the rear of the printer when a RS-232C Serial Interface Circuit Board is installed.

Interface circuit boards are available from your Dealer/Distributor.

Interface cables are available from most dealers, independent cable manufacturers and others.

CAUTION
Make sure your computer and printer are turned OFF before connecting an interface cable.

Connect one end of the interface cable to the Interface Circuit Board receptacle at the rear of your printer and the other end into your system.

Refer to **Figure 1-11** if connecting a Parallel Interface.

Refer to **Figure 1-12** if connnecting a Serial Interface.

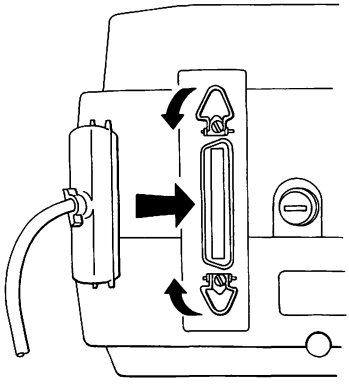


Figure 1-11 Parallel Interface Cable Connector

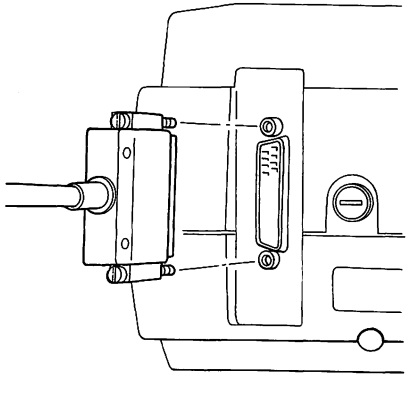


Figure 1-12 Serial Interface Cable Connector

SECTION 2
OPERATION

This section describes the Operator Panel, Ribbon Cassette installation, the Paper Thickness Adjustment and Loading/Exchanging Paper.

2.1 OPERATOR PANEL

Refer to **Figure 2-1** and paragraphs 2.2 (Lamps) and 2.3 (Switches). There are four lamps and four switches on the Operator Panel.

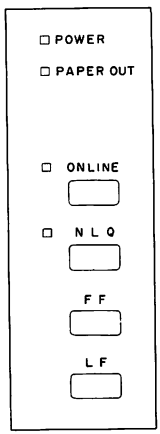
Operator panel	Functions
	POWER Lamp (Green) Lit when Power Switch is ON. PAPER OUT Lamp (Amber) Lit when Out-of-Paper detected. Flashes when Operator Setup mode is selected (see paragraph 2.3.3). ON LINE Lamp (Green) Lit when the printer is ON LINE with the host system. ON LINE Switch Sets ON LINE or OFF LINE mode. NLQ Lamp (Green) Lit when Near Letter Quality print mode is set. NLQ Switch Sets NLQ or Selected print mode. FF and LF Switches Explained in paragraph 2.3.

Figure 2-1 Operator Panel

2.2 OPERATOR PANEL LAMPS

POWER Lamp (Green)

Lit when the Power Switch is turned ON and power is applied to the printer.

PAPER OUT Lamp (Amber)

Lit when Out-of-Paper is detected (or when a Cut Sheet Feeder is installed and the bin is out of paper).
Flashes when the printer is in the Operator Setup mode (see paragraph 2.3.3).

ON LINE Lamp (Green)

Lit when the printer is ON LINE with the host system.

NLQ Lamp (Green)

Lit when Near Letter Quality print mode is selected. See NLQ Switch.

2.3 OPERATOR PANEL SWITCHES

ON LINE Switch

Sets ON LINE or OFF LINE mode.

Press this switch, in ON LINE mode, to place the printer in OFF LINE mode. In OFF LINE mode, the ON LINE lamp is off and printing from the host system is stopped. Use OFF LINE mode to change the ribbon cassette or load paper.

Press this switch, in OFF LINE mode, to place the printer in ON LINE mode and allow it to communicate with your host system (Power must be ON before the printer enters ON LINE mode).

When the printer is OFF LINE, any Print data transferred by your computer and waiting to be printed, is stored in the printer's data buffer. If power remains ON, this stored print data is printed when the printer is returned ON LINE.

NLQ (Near Letter Quality) Switch

Sets NLQ or selected print quality mode.

Press the NLQ switch to change from the present print quality to Near Letter Quality printing.

Press this switch a second time to return to the selected print quality.

If you press this switch while printing, print quality changes on the next print line.

FF (Form Feed) Switch

Function depends on:
1. ON LINE/OFF LINE status of the printer.
2. Position of the Paper Release Lever.
3. Paper loaded/unloaded status.

When the printer is OFF LINE, Paper Release Lever is set toward the front of the printer, if paper is not loaded, when using paper less than 8.5" wide with the 80-column or the 136-column printer — Press this switch to automatically load paper onto the Platen.

> **NOTE:**
> With the 136-column printer, load cut sheet paper more than 8.5" wide manually.

When the printer is OFF LINE, Paper Release Lever is set toward the rear of the printer, if paper is not loaded — With the 80-column printer, press this switch to automatically load the paper onto the Platen. With the 136-column printer, this switch will have no effect.

When the printer is ON LINE, Paper Release Lever is set toward the front of the printer, if paper is loaded — Press this switch to eject the paper. The PAPER OUT lamp will light.

When the printer is ON LINE, Paper Release Lever is set toward the rear of the printer, and continuous form is loaded — Press this switch to retract the continuous form by 15" or off the Platen, but still in the forms tractor, in preparation for cut sheet paper operations.

When the printer is OFF LINE, Paper Release Lever is set toward the front of the printer, if paper is loaded — Press this switch to eject the paper. The PAPER OUT lamp will light.

When the printer is OFF LINE, Paper Release Lever is set toward the rear of the printer, and continuous form is loaded — Press this switch to feed the form 11", 12" or 8.5" depending on the setting of DIP switch 1-5 and Operator Setup.

> **NOTE:**
> Make sure that DIP switch 1-5 is properly set according to the length of paper being used.

LF (Line Feed) Switch

Regardless of the Paper Release Lever setting, when the printer is OFF LINE, press this switch momentarily to move the paper one line forward. Hold this switch down to move paper continuously.

When the printer is OFF LINE, press the FF switch while holding the LF switch down to move the paper continuously in the backward direction until the Power Switch is turned off or the paper end is detected.

When the printer is ON LINE, pressing this switch will have no effect.

2.3.1 Self-Test

Start the Self-Test print pattern by turning the Power Switch ON while holding the LF switch down. Turn the Power Switch OFF to stop Self-Test. See paragraph 1.10 for more Self-Test information.

2.3.2 Hexadecimal-Dump

Turning the Power Switch ON while holding both the LF and FF switches down sets the Hexadecimal-Dump mode. This mode causes print data from the host system to print in hexadecimal (rather than ASCII). This mode is helpful when analyzing a suspected printer malfunction. Turn the Power Switch OFF to stop the Hexadecimal-Dump mode.

2.3.3 Operator Setup Mode

When the printer is ON LINE, enter Operator Setup mode by pressing the ON LINE and FF switches at the same time. The PAPER OUT lamp will flash and a buzzer will sound twice when the printer is in the Operator Setup mode.

Operator Setup mode allows you to set the functions listed in **Table 2-1**. Note that you cannot change a function if data is loaded in the buffer.

1. Press the ON LINE and FF switches at the same time to enter Operator Setup mode in ON LINE mode.

2. Press the ON LINE switch to select a function. A buzzer will sound each time of press. For example, press the ON LINE switch twice to select the function — Double-width Characters.

3. Press the FF switch to set the selected function. A buzzer will sound. In the above example, pressing the FF switch would cause Double-width Characters to be set.

   You may set more than one function by pressing the ON LINE switch at the times of the function and then pressing the FF switch. For example, after setting — Double-width Characters, press ON LINE two more times (total of four times) to select Unidirectional Print mode, then press FF to set it into the printer.

4. Press the LF switch to terminate the Operator Setup mode. PAPER OUT lamp will go off.

5. Press the ON LINE switch to return to the ON LINE mode.

Table 2-1 Operator Setup Mode Functions

Press ON LINE	Function Selected
0	All Functions are Reset if FF is pressed
1	Condensed Characters
2	Double-width Characters
3	Elite Pitch Characters
4	Unidirectional Print mode
5	Disable or Enable Paper Out Detector*
6	Change Form Length (11″ to 12″ or 12″ to 11″)
7	Set Form Length at 8.5″
8	Enable Skip Over Perforations
9	Set line spacing at 8 lines per inch
10	Use only the Blue Ribbon
11	Use only the Red Ribbon
12	Half speed Print mode
13	View Print mode

* A function of Disable or Enable Paper Out Detector will be performed as opposed to the setting of DIP switch 1-3.

2.3.4 Buzzer

A buzzer will sound when a Paper-Out condition is detected in ON LINE mode and also when the Operator Setup mode is set.

2.3.5 Summary of Switch Functions

Figure 2-2 gives a summary of the switch functions.

	POSITION OF PAPER RELEASE LEVER	
	FORWARD (Cut Sheet Paper)	BACKWARD (Continuous Form)
SWITCH PRESSED	ON LINE MODE	ON LINE MODE
ON LINE	OFF LINE	OFF LINE
NLQ	Change print quality from Selected to Near Letter Quality, vice versa.	Change print quality from Selected to Near Letter Quality, vice versa.
FF	Form Feed.	Retracts form by 15" or off the Platen, but form remains in tractors.
LF	No response when ON LINE	No response when ON LINE
SWITCH PRESSED	OFF LINE MODE	OFF LINE MODE
ON LINE	ON LINE	ON LINE
NLQ	Change print quality from Selected to Near Letter Quality, vice versa.	Change print quality from Selected to Near Letter Quality, vice versa.
FF	If paper is loaded, Form Feed is performed. If paper is not loaded, in the 80-column printer and the 136-column printer with less than 8.5" paper, a Paper Auto Load is performed. Line Feed is performed.	If paper is loaded, form is advanced 11", 12" or 8.5", depending on DIP switch 1-5 and Operator Setup. If paper is not loaded, in the 80-column printer only , a Paper Auto Load is performed.
LF	Line Feed is performed. Press the FF switch while holding the LF switch downto perform Line Feed in the backward direction.	Line Feed is performed. Press the FF switch while holding the LF switch down to perform Line Feed in the backward direction.

Figure 2-2 Summary of Operator Panel Switches

2.4 INSTALLING/REMOVING A RIBBON CASSETTE

Your printer uses either a monochrome or four-color ribbon cassette. The monochrome ribbon must have support tabs as shown in **Figure 1-2**. The optional color kit must be installed to print in color.

> **RIBBON CASSETTE NOTES:**
> Do not try to move the print head if power is ON. Power should remain ON if print data is in the printer waiting to be printed.
> If power is OFF, slide the print head from side to side to ensure the ribbon advances.

2.4.1 Removing a Ribbon Cassette

Refer to **Figure 2-3**.

1. Open the soundproof, front and top covers. If power is OFF, move the print head to the center of the print line.

2. Remove the ribbon cassette by pulling one of the ribbon release levers towards the front of the printer.

3. Lift the cassette out of the printer.

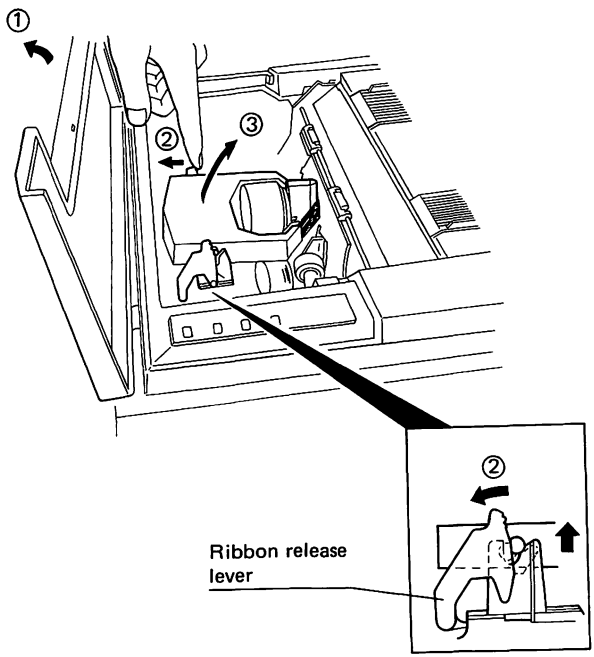
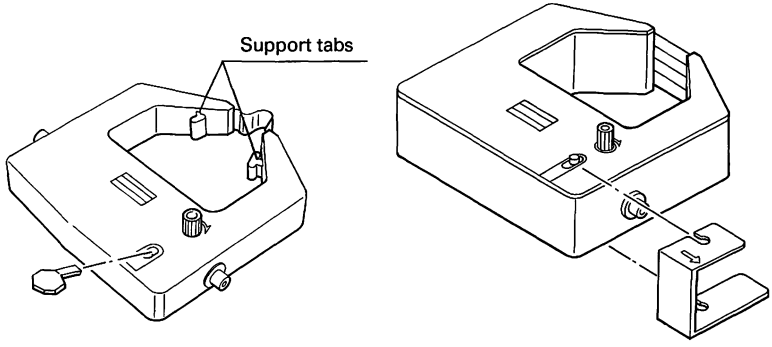


Figure 2-3 Removal of Ribbon Cassette

2.4.2 Installing a Ribbon Cassette

Take the ribbon cassette out of its package and remove the ribbon stop as shown in **Figure 2-4**.



(Monochrome ribbon cassette) (Color ribbon cassette)

Figure 2-4 Removing the Ribbon Stop

If using a monochrome ribbon, ensure the support tabs are present on the cassette, as shown in **Figure 2-4**.

Rotate the Ribbon Advance Knob, on the ribbon cassette, in the direction indicated by the arrow. This is done to remove ribbon slack.

Refer to **Figure 2-5**.

1. With the top cover open, insert the pins sticking out on both sides of the cassette into the gaps between the ribbon release levers and the carriers.

> **NOTE:**
> Make sure that the ribbon is set between the print head and the card guide without folded.

2. Press down lightly on the ribbon cassette while rotating the Ribbon Advance Knob, until you hear the cassette pins click into a locked position.

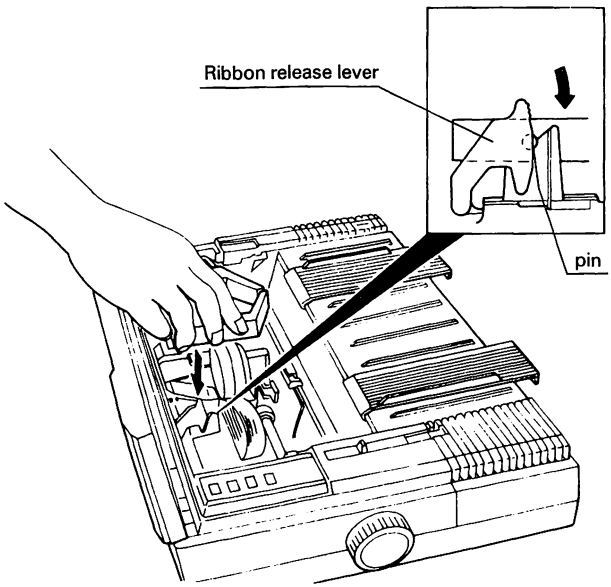


Figure 2-5 Installation of Ribbon Cassette

> **NOTE:**
> When the Cut Sheet Feeder is equipped, move the print head to the left end.

2.5 ADJUSTING PAPER THICKNESS

You can use up to 3-part paper (include the original) in your printer. Adjust the Paper Thickness Lever to change the gap between the print head and the Platen to correspond to the number of copies and the thickness of paper you are using.

The print head moves about 0.07mm (0.0027"), towards or away from the Platen, for each notch position of the Paper Thickness Lever.

One notch difference corresponds to about one sheet of paper.

Set the Paper Thickness Lever before loading paper.

Adjust the Paper Thickness Lever as follows:

Refer to **Figure 2-6**.

Locate the Paper Thickness Lever at the left side frame of the printer.

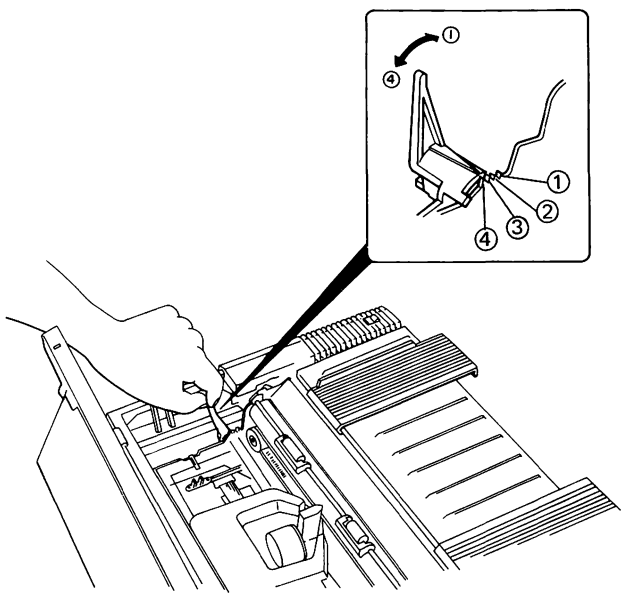


Figure 2-6 Paper Thickness Lever

Select an initial Paper Thickness Lever setting, using the values shown in **Table 2-2** as a guide. The first notch position is the one nearest the Platen.

Table 2-2 Paper Thickness Lever Settings

Type of Paper	Notch Position
Single part	2
Two part	2 or 3
Three part	3 or 4

When using thick paper, use a higher notch position number to allow for a wider gap, regardless of the number of sheets.

Total paper thickness may vary with the thickness of carbon paper and glue.

Adjust the Paper Adjust Lever to obtain the best print quality for the paper you are currently using.

If the printed characters appear faint, due to a wide gap, use a lower notch position number to decrease the size of the gap.

If the setting of the Paper Adjust Lever is too narrow:

The ribbon may smear the paper as it is advanced.

If the setting of the Paper Adjust Lever is too wide:

The images may be printed too light to read.

2.6 LOADING CUT SHEET PAPER

If you have been printing on continuous forms, refer to paragraph 2.8 for the procedure to change to cut sheet paper.

If you plan to run Self-Test, we recommend that you use continuous forms (more than 9" wide for the 80-column printer and more than 15" wide for the 136-column printer). Self-Test prints the maximum characters per print line and if printing occurs off the paper the print head and Platen may be damaged.

2.6.1 Procedures for Loading Cut Sheet Paper with the Auto Load Function

The following procedures apply to both the 80-column and 136-column printers. When using the 136-column printer, use paper less than 8.5" wide.

1. Open the soundproof cover and the front cover.

2. Lift the Rear Cover to the vertical position as shown in **Figure 2-7**.

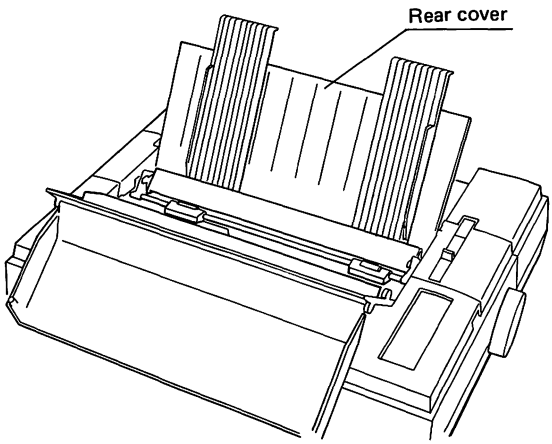


Figure 2-7 Setting the Rear Cover

3. Move the Guides (on the Rear Cover) to help align the paper to the desired position and set the bail rollers 1" in from the edges of the paper being loaded as shown in **Figure 2-8**.

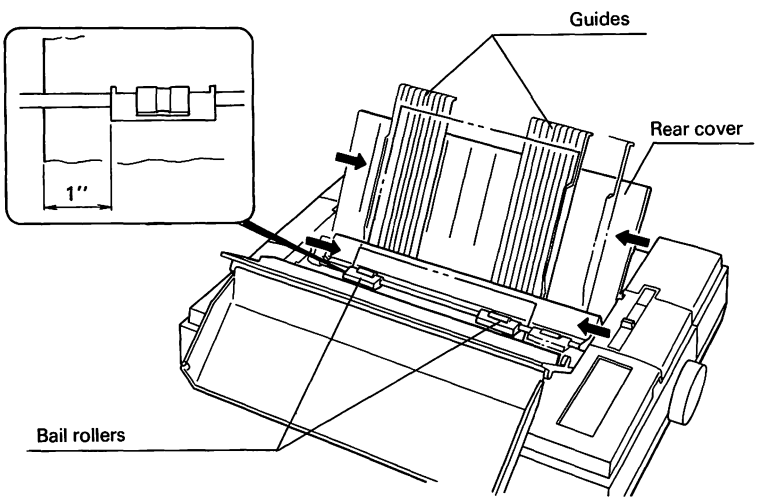


Figure 2-8 Setting the Bail Rollers and Guides (for the 80-column printer)

NOTE:
With the 136-column printer, set the left roller 1" in from the left edge of the paper, the center roller 1" in from the right edge of the paper, and the right roller at the right edge of the Platen as shown in **Figure 2-9**.

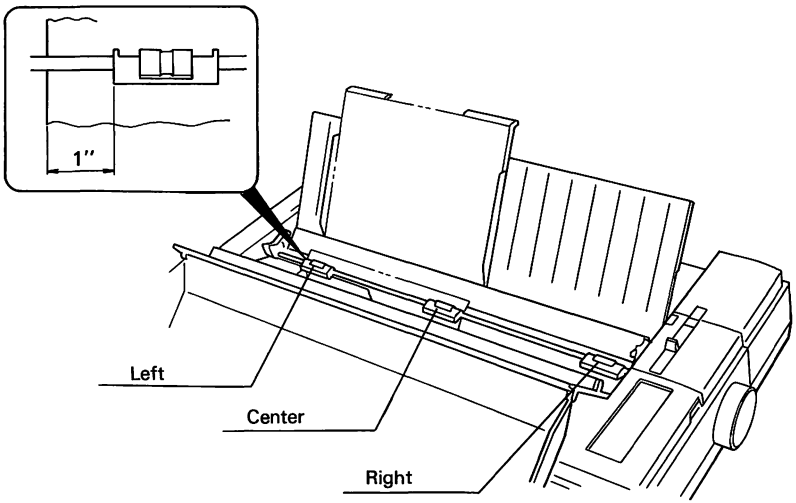


Figure 2-9 Setting the Bail Rollers (for the 136-column printer)

4. If required, adjust the Paper Thickness Lever to correspond to paper being loaded according to paragraph 2.5.

5. Close the covers. The soundproof cover should be put against the Rear Cover as shown in **Figure 2-10**.

6. Pull the Paper Release Lever towards the front of the printer (cut sheet paper mode) as shown in **Figure 2-10**.

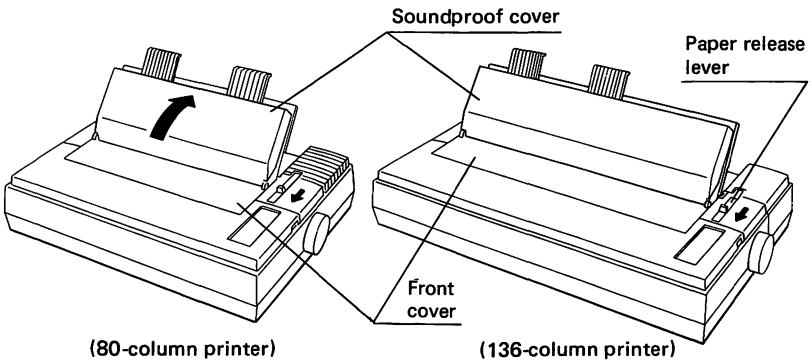


Figure 2-10 Closing the Covers

7. Turn the Power Switch ON. Place a sheet of paper into the Rear Cover. It will slide behind the Platen as shown in **Figure 2-11**.If the paper is not inserted correctly, a paper feed error or skewed feeding may occur.

> **NOTE:**
> Make sure that the cut sheet paper is neither curled nor damaged, because it may cause a paper jam or misfeed.

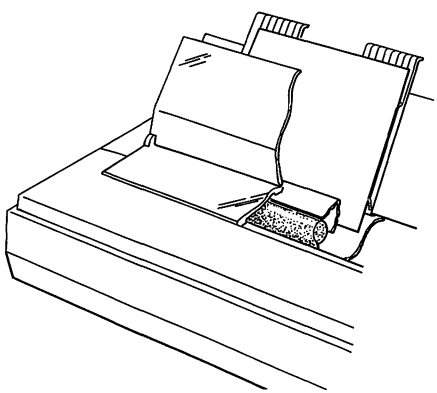


Figure 2-11 Placing the Paper

8. Press the FF switch. The print head moves into its paper load position, and the sheet of paper is automatically fed into the printer and advanced 1/6 of an inch below the leading edge of the form.

9. Press the ON LINE switch to set the printer to ON LINE mode.

2.6.2 Procedures for Manual Loading of Cut Sheet Paper

When using paper more than 8.5" wide with the 136-column printer, apply the following procedures.

1. Open the soundproof cover and the front cover.

2. Lift the Rear Cover to the vertical position and move the Guides (on the Rear Cover) to help align the paper to the desired position as shown in **Figure 2-12**.

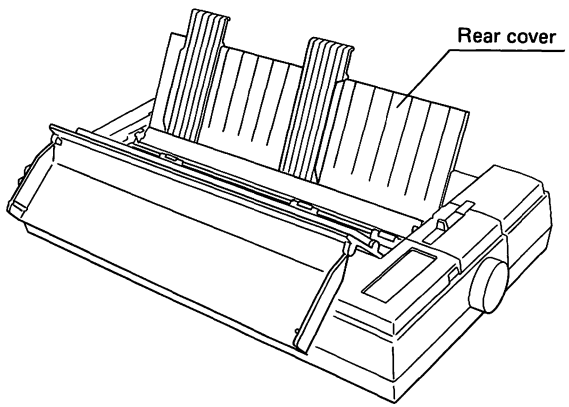


Figure 2-12 Setting the Rear Cover

3. If required, adjust the Paper Thickness Lever to correspond to paper being loaded according to paragraph 2.5.

4. Pull the Paper Release Lever towards the front of the printer (cut sheet paper mode).

5. Place a sheet of paper into the Rear Cover. It will slide behind the Platen. Lift the bail lever to open bail rollers as shown in **Figure 2-13**.

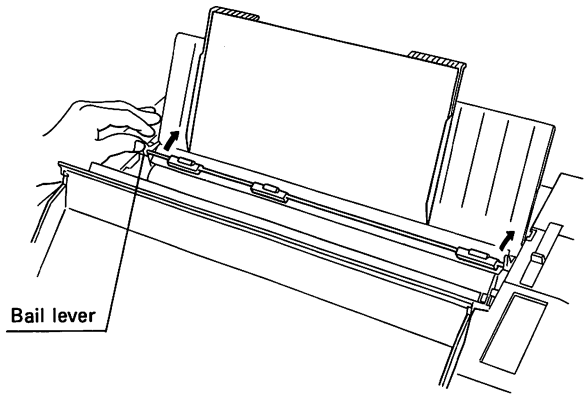


Figure 2-13 Loading the Paper and Opening the Bail Rollers

6. Turn the Platen Knob manually in the direction of the arrow in **Figure 2-14** until the paper is held between the Platen and the bail rollers.

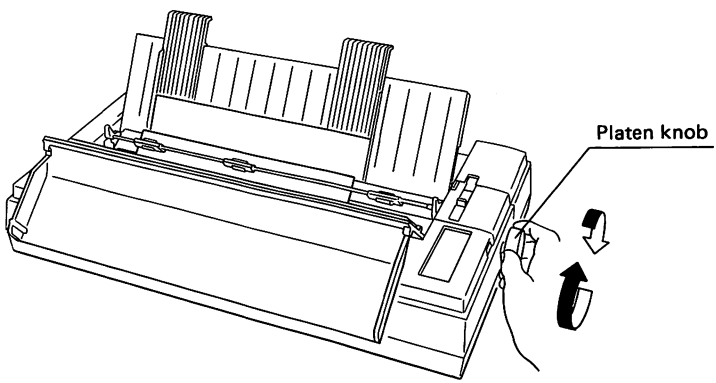


Figure 2-14 Loading the Paper

7. Push down the bail lever to close the bail rollers. Set the left roller 1" in from the left edge of the paper, the center roller at the center of the paper, and the right roller 1" in from the right edge of the paper as shown in **Figure 2-15**.

> **NOTE:**
> Make sure that the paper is set between the Platen and the rollers.

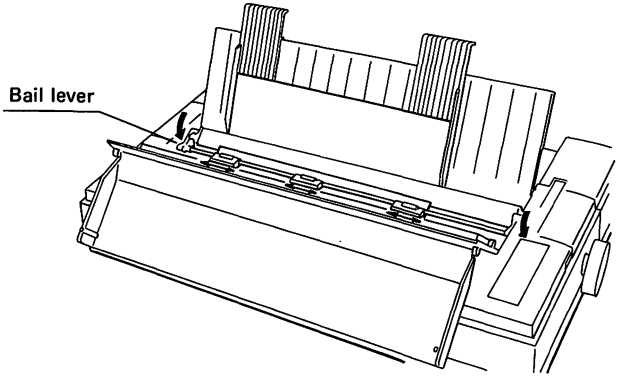


Figure 2-15 Setting the Bail Rollers

8. Close the covers. The soundproof cover should be put against the Rear Cover as shown in **Figure 2-16**.

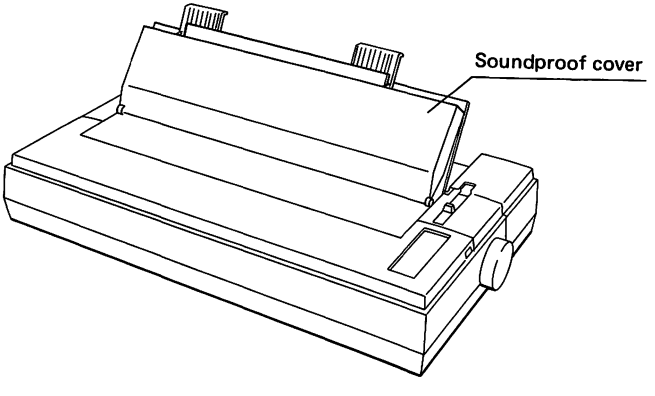


Figure 2-16 Closing the Covers

9. Press the ON LINE switch to set the printer to ON LINE mode.

2.7 LOADING CONTINUOUS FORMS

If you plan to run Self-Test, we recommend that you use continuous forms (more than 9" wide for the 80-column printer and more than 15" wide for the 136-column printer). Self-Test prints the maximum characters per print line and if printing occurs off the paper the print head and Platen may be damaged.

Once you load continuous forms into the printer, your printer makes it easy for you to change between cut sheets and continuous forms. See paragraph 2.8 if continuous forms are loaded in the form tractors.

The following procedures apply to both the 80-column and 136-column printers.

1. Open the soundproof cover and remove the rear cover as shown in **Figure 2-17**.

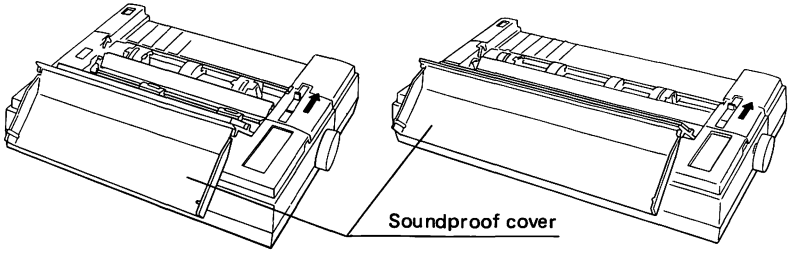


Figure 2-17 Loading Continuous Forms (1)

2. If required, adjust the Paper Thickness Lever to correspond to the forms being loaded according to paragraph 2.5.

3. Push the Paper Release Lever towards the rear of the printer (continuous form mode).

4. With the 80-column printer, set the bail rollers 1 " in from the edges of the paper being loaded as shown in **Figure 2-18**.

> **NOTE:**
> With the 136-column printer, it is not necessary to set the bail rollers here.

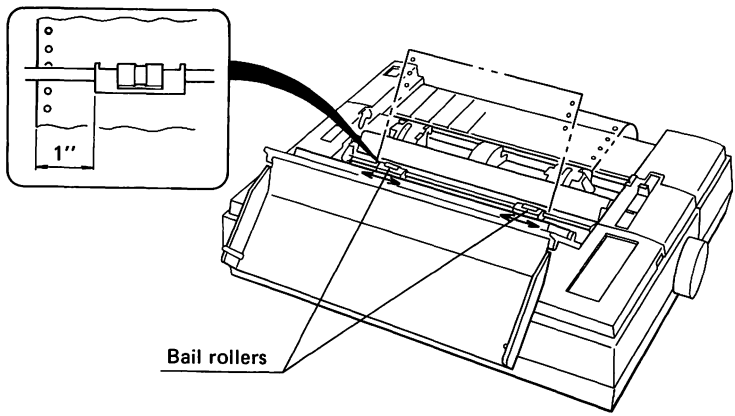


Figure 2-18 Setting Bail Rollers (for the 80-column printer)

5. Before trying to move a forms tractor, set the forms tractor lock lever towards the rear of the printer (into its unlocked position) as shown in **Figure 2-19**. Slide the right forms tractor towards the right side of the printer (just to get it out of the way).

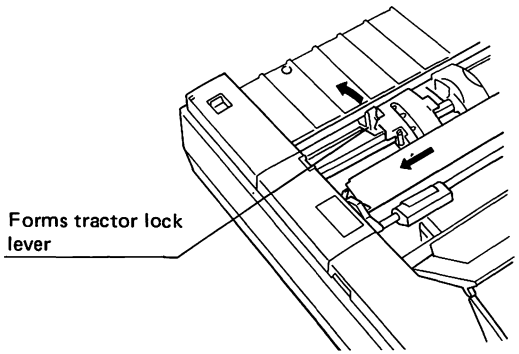


Figure 2-19 Unlocking the Forms Tractor

6. Place the left forms tractor at the approximate position for printing the left margin, referring to the column scale.

7. Lock the left forms tractor into position by setting the lock lever towards the front of the printer as shown in **Figure 2-20**.

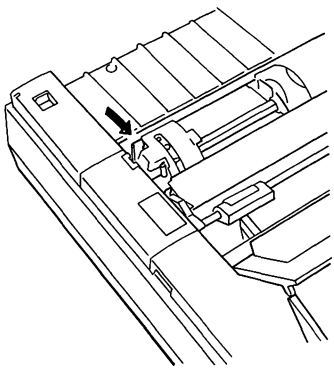


Figure 2-20 Loading Continuous Forms (2)

8. Open the paper holders on both tractors as shown in **Figure 2-21**.

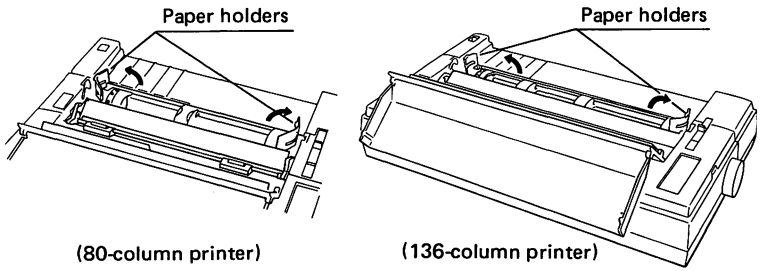


Figure 2-21 Opening the Tractor Paper Holders

9. Place the holes (down the left side of the form) over the pins on the left tractor and close the paper holder.

10. Move the right tractor under the paper. Place the holes (down the right side of the form) over the pins in the right tractor and close the paper holder. After moving the right tractor (and installed form) to remove slack from the paper, lock it by setting the lock lever towards the front of the printer.

> **NOTE:**
> Make sure that the leading edge of the form is neither curled nor damaged, because it may cause a paper jam.

11. [With the 80-column printer]

    Confirm that the Power Switch is ON and then press the FF switch. The print head moves into its form load position and the form is automatically fed into the printer and advanced to about 1 inch below the leading edge of the form.

11. [With the 136-column printer]

(a) Lift up the bail lever to open the bail rollers as shown in **Figure 2-22**.

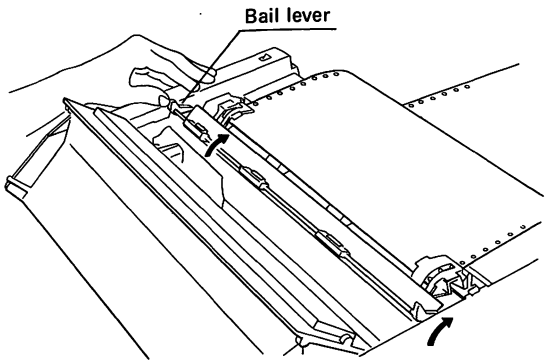


Figure 2-22 Opening the Bail Rollers

(b) Turn the Platen Knob manually in the direction of the arrow in **Figure 2-23** until the paper is held between the Platen and the bail rollers.

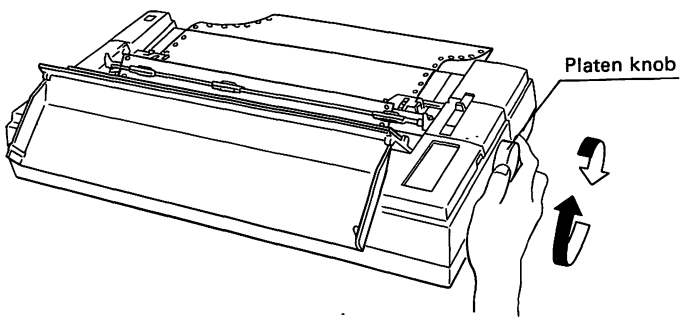


Figure 2-23 Loading the Continuous Forms

(c) Push down the bail lever to close the bail rollers and set the bail rollers as follows.

For forms less than 8.5″ wide

Set the left roller 1″ in from the left edge of the form, the center roller 1″ in from the right edge of the form, and the right roller at the right edge of the Platen as shown in **Figure 2-24**.

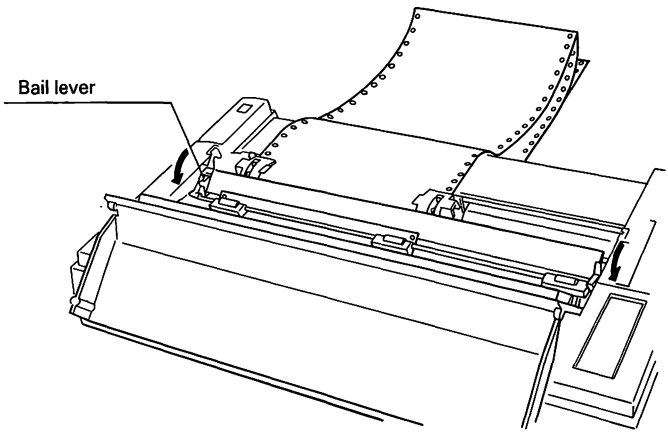


Figure 2-24 For Forms less than 8.5″ Wide

For forms more than 8.5″ wide

Set the left roller 1″ in from the left edge of the form, the center roller at the center of the form, and the right roller 1″ in from the right edge of the form as shown in **Figure 2-25**.

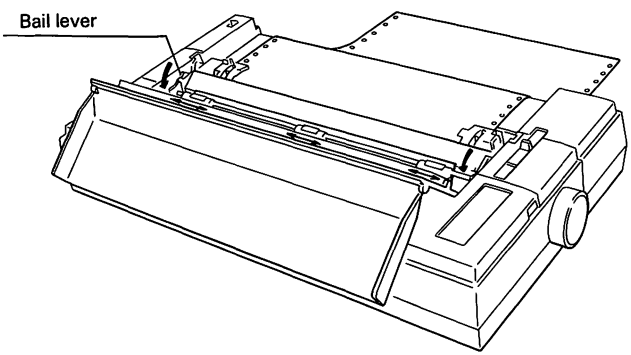


Figure 2-25 For Forms more than 8.5″ Wide

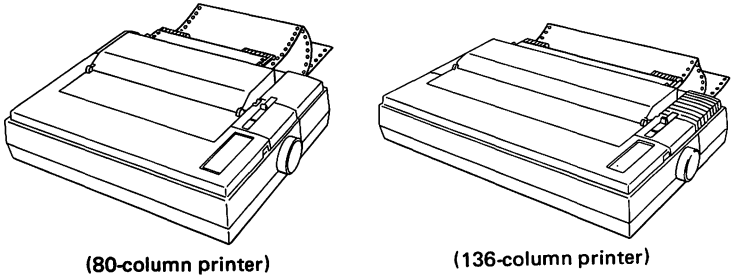
NOTE:
Make sure that the paper is between the Platen and the rollers.

12. Replace the Rear Cover and close the front cover and soundproof cover.

NOTE:
The Guides (on the Rear Cover) should be adjusted for the form width.

13. Press the ON LINE switch to set the printer ON LINE.

14. Continuous forms feed through the printer as shown in **Figure 2-26**.



(80-column printer) (136-column printer)

Figure 2-26 Feeding Continuous Forms

2.8 CHANGING FROM CONTINUOUS FORMS TO CUT SHEETS

When continuous forms are in the printer, change to cut sheet paper as follows:

1. Retract the continuous form out of the Platen, with the printer ON LINE and the Paper Release Lever pushed toward the rear of the printer, by pressing the FF switch (or by turning the Platen Knob manually).

2. After pulling the Paper Release Lever toward the front of the printer and placing the Rear Cover in its vertical position, load cut sheet paper into the printer as in paragraph 2.6.

> **NOTE:**
> The continuous form remains in the form tractors but does not move as long as the Paper Release Lever is in the forward (Cut Sheet) position.

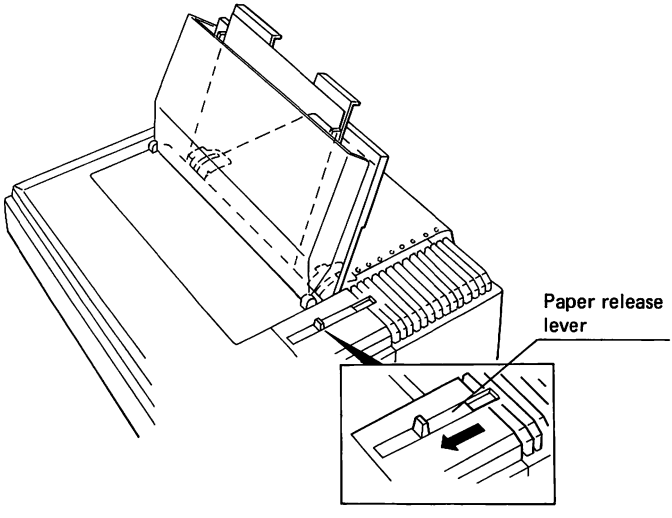


Figure 2-27 Changing from Continuous Forms to Cut Sheet Paper

2.9 CHANGE BACK TO CONTINUOUS FORMS

2.9.1 For the 80-column printer

When you have finished printing with cut sheet paper, change back to continuous forms by placing the Paper Release Lever in its backward position and pressing the FF switch as in paragraph 2.7. The continuous forms will re-load automatically.

2.9.2 For the 136-column printer

When you have finished printing with cut sheet paper, change back to continuous forms by placing the Paper Release Lever in its backward position and turning the Platen Knob manually to re-load the continuous forms as in paragraph 2.7.

> **NOTE:**
> Make sure that the paper is between the Platen and bail rollers.

SECTION 3
DIP SWITCHE FUNCTIONS

This section provides additional information on the default print functions selected by the DIP switches installed on the Memory Circuit Board and the Serial Interface Circuit Board. The Parallel Interface Circuit Board does not have DIP switches.

Refer to paragraph 1.7 for information on how to access these DIP switches.

Use a pointed object, like the tip of a mechanical pencil, to push a DIP switch ON or OFF.

If you change a DIP switch setting while power is turned ON there will be no change to the selected function until power has been turned OFF and then turned ON, or until an INIT command is received from the host system.

Functions selected by a DIP switch may be overridden by your application software.

We suggest you record the DIP switch settings that provide the best performance with your applications.

The functions set by the DIP switches on the Memory Circuit Board are described in paragraphs 3.1 and 3.2. These functions are used for all printers regardless of interface type.

The functions set by the DIP switches on the Serial Interface Circuit Board are described in paragraph 3.3. These functions are only used when a Serial Interface Circuit Board is installed in the printer.

3.1 MEMORY CIRCUIT BOARD DIP SWITCH-1

Memory Circuit Board DIP switch-1 position #1 selects Character Size as shown in **Table 3-1**.

Table 3-1 DIP Switch-1 #1

Position	Character Size
OFF	Standard Character Size (Defined as 10 CPI)
ON	Condensed Character Size (Defined as 17.1 CPI)

Memory Circuit Board DIP switch-1 position #2 selects slashed or unslashed zero as shown in **Table 3-2**.

Table 3-2 DIP Switch-1 #2

Position	Zero Font
OFF	Unslashed Zero — 0
ON	Slashed Zero — Ø

Memory Circuit Board DIP switch-1 position #3 enables or disables the Paper Out Detector as shown in **Table 3-3**. This switch is useful for continuous forms.

Table 3-3 DIP Switch-1 #3

Position	Paper Out Detector
OFF	Enable Paper Out Detector
ON	Disable Paper Out Detector

With the Paper Out Detector disabled, when the paper runs out:

The PAPER OUT lamp lights
*The printer stays in ON LINE mode
Buzzer does not sound
*Printing continues

The operations marked "*" occurs when continuous forms are used.

Memory Circuit Board DIP switch-1 position #4 selects RAM storage usage as shown in **Table 3-4**.

Table 3-4 DIP Switch-1 #4

Position	RAM Storage Usage
OFF	All RAM storage is used for Data Input Buffer
ON	RAM storage is used for Scanning Buffer of four colors and Data Input Buffer.

When Switch 4 is Off, the RAM is selected as a Data Input Buffer. Print data from the host is loaded into the RAM and data transfer time is minimized.

When Switch 4 is On, the RAM is selected as the Color Scanning Buffer and Data Input Buffer.

Memory Circuit Board DIP switch-1 position #5 selects Paper Length as shown in **Table 3-5**.

Table 3-5 DIP Switch-1 #5

Position	Paper Length
OFF	11 inch Paper
ON	12 inch Paper

Memory Circuit Board DIP switch-1 positions #6, #7 and #8 select an international character set as shown in **Table 3-6**. This allows the unique symbols in the selected language to be printed.

Table 3-6 DIP Switch-1 #6, #7 and #8

Selected Language	Switch-1 Setting		
	#6	#7	#8
U.S.A.	ON	ON	ON
French	ON	ON	OFF
German	ON	OFF	ON
English	ON	OFF	OFF
Danish	OFF	ON	ON
Swedish	OFF	ON	OFF
Italian	OFF	OFF	ON
Spanish	OFF	OFF	OFF

3.2 MEMORY CIRCUIT BOARD DIP SWITCH-2

Memory Circuit Board DIP switch-2 position #1 determines when the Printer's ON LINE operations are enabled.

See **Table 3-7**.

When this switch is ON, the printer's ON LINE operations are enabled as soon as power is turned ON.

When this switch is OFF and if $\overline{\text{SLCT IN}}$ signal is high, the printer's ON LINE operations are disabled until the first DC1 Control Code is received.

When this switch is OFF and if $\overline{\text{SLCT IN}}$ signal is low, the printer's ON LINE operations are enabled as soon as power is turned ON.

Table 3-7 DIP Switch-2 #1

Position	Mode when Power is Turned ON
OFF	Depends on $\overline{\text{SLCT IN}}$ signals (see above)
ON	ON LINE operations enabled

Set this switch OFF if your host system issues a DC1/DC3 to select/deselect the printer.

Memory Circuit Board DIP switch-2 position #2 enables the optional Cut Sheet Feeder (if a Sheet Feeder is installed) as shown in **Table 3-8**.

Table 3-8 DIP Switch-2 #2

Position	Cut Sheet Feeder
OFF	Disabled (Feeder not installed)
ON	Enabled (Feeder installed)

Memory Circuit Board DIP switch-2 position #3 selects skipping 1" or printing at the perforations at the end of each form (when continuous forms are used), as shown in **Table 3-9**.

Table 3-9 DIP Switch-2 #3

Position	Skip Over Perforation
OFF	Disabled (Print over perforation)
ON	Enabled (Skip 1" at perforation)

Set this switch OFF if your host system or software causes a skip over the perforation.

Memory Circuit Board DIP switch-2 position #4 enables or disables a Line Feed with each CR code.

When this switch is set ON, a line feed is performed automatically following a CR code.

When this switch is set OFF and if $\overline{\text{AUTO FEED XT}}$ signal is low, a line feed is performed following a CR code.

When this switch is set OFF and if $\overline{\text{AUTO FEED XT}}$ signal is high, a line feed is not performed.

Table 3-10 DIP Switch-2 #4

Position	Line Feed with Carriage Return
OFF	Depends on $\overline{\text{AUTO FEED XT}}$ signals (see above)
ON	Enabled (LF with CR)

Set this switch OFF if your host system or software causes a LF (Line Feed) code to be issued with each CR (Carriage Return) code.

3.3 SERIAL INTERFACE BOARD DIP SWITCH

Serial Interface Circuit Board DIP switch position #1 selects Protocol as Printer READY/BUSY or XON/XOFF, as shown in **Table 3-11**.

Table 3-11 Serial Interface DIP Switch #1

Position	Data Protocol
OFF	Printer Ready/Busy Protocol
ON	XON/XOFF Protocol

Serial Interface Circuit Board DIP switch position #2 selects a 7-bit or an 8-bit data word length, as shown in **Table 3-12**.

Table 3-12 Serial Interface DIP Switch #2

Position	Data Length
OFF	8-bit Data Word Length
ON	7-bit Data Word Length

Serial Interface Circuit Board DIP switch position #3 selects parity checking or no-parity checking, as shown in **Table 3-13**.

Table 3-13 Serial Interface DIP Switch #3

Position	Parity Checking
OFF	No-Parity Check
ON	Parity Check

If parity checking is enabled (DIP switch #3 ON), Serial Interface Circuit Board DIP switch position #4 selects even or odd parity, as shown in **Table 3-14**.

Table 3-14 Serial Interface DIP Switch #4

Position	Even or Odd Parity
OFF	Odd Parity
ON	Even Parity

Serial Interface Circuit Board DIP switch position #5 selects 1-stop bit or 2-stop bits in the data stream, as shown in **Table 3-15**.

Table 3-15 Serial Interface DIP Switch #5

Position	Number of Stop Bits
OFF	1-Stop Bit
ON	2-Stop Bits

CAUTION

The data must consist of 10 or 11 bits, i.e., a start bit, 7 or 8 data bits, a parity bit or without a parity bit, and 1 or 2 stop bits.

Serial Interface Circuit Board DIP switch positions #6, #7 and #8 select the Baud Rate (Data transmission rate) between the host system and the printer, as shown in **Table 3-16**.

Table 3-16 Serial Interface DIP Switch #6, #7 and #8

Selected Baud Rate	SI Switch Setting		
	#6	#7	#8
Undefined	ON	ON	ON
9600	ON	ON	OFF
4800	ON	OFF	ON
2400	ON	OFF	OFF
1200	OFF	ON	ON
600	OFF	ON	OFF
300	OFF	OFF	ON
200	OFF	OFF	OFF

SECTION 4
PRINTER CARE

This section describes the printer's initialization cycle, gives basic troubleshooting hints, explains the cleaning and lubrication procedures, and describes how to repack the printer for storage or transport.

4.1 PRINTER INITIALIZATION

A printer initialization cycle occurs:

1. Each time the Power Switch is turned ON
2. When an INIT signal is received from the host system
3. When an ESC @ (Escape Code Sequence) is received from the host system.

A normal initialization cycle causes the printer to:

Perform a basic internal check on its circuits.

Light the POWER lamp.

Move the print head to column one.

Enter the ON LINE mode (if paper is inserted) and light the ON LINE lamp.

Read the DIP switch settings and set the default print parameters.

Set the current print line as Top of Form.

Set the left margin at print position 1.

Clear previously stored download and data buffer information.

Self-Test will start if the LF (Line Feed) switch is held down when the Power Switch is turned ON.

4.2 REMOVING A PAPER JAM

See **Figure 4-1**.

1. Turn power OFF and open the soundproof, front and top covers. If using continuous forms, cut the form where it passes the Card Guide.

2. Push the Paper Release Lever towards the rear of the printer.

3. Place the Paper Thickness Lever into position 4.

4. Place the print head at either end of the print line or at a place where it does not interfere with removing forms.

5. If using continuous forms, open the tractor's paper holder, remove the forms, and close the paper holder. Carefully pull the jammed paper or forms from the feed path. Try to avoid tearing the paper. While turning the Platen Knob, remove all scraps of paper from beneath the Platen.

6. Move the print head to the center of the print line.

7. Put the Paper Release Lever and the Paper Thickness Lever into their operating positions.

8. Insert fresh paper into printer and rotate the Platen Knob to advance the paper through the printer. (Do not use Auto Load function.)

9. Close the covers and turn power ON.

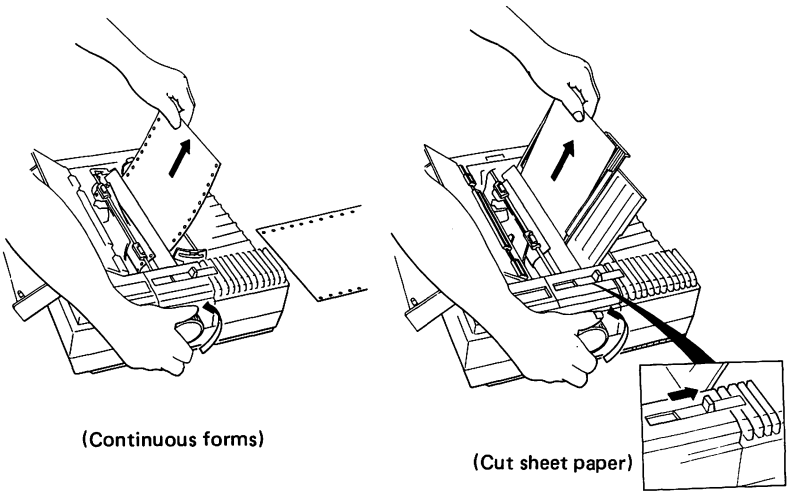


Figure 4-1 Removing a Paper Jam

4.3 CLEANING AND LUBRICATION

CLEANING AND LUBRICATION NOTES:

Printer lubrication is generally not required and is best performed by a service technician.

Do not use alcohol to clean rubber parts (Platen, rollers, etc.). Alcohol may cause the rubber to harden.

Operator maintenance is limited to cleaning the printer, ensuring there is lubrication on the print head guide shaft, and cleaning the Platen as follows:

Ensure power is OFF and the AC power cord is disconnected before cleaning or lubricating the printer.

1. Clean the outer surfaces of the printer with a soft cloth dampened with a mild detergent.

2. With a small vacuum cleaner, the operator may remove accumulations of paper dust and particles from inside the printer.

3. Clean the Platen by applying a dry cloth to the Platen.

4.4 BASIC TROUBLESHOOTING

Your printer is designed to provide reliable operation. If it happens to malfunction use **Table 4-1** to help identify and resolve the difficulty.

Check your computer and application software manual for additional suggestions. If Self-Test performs correctly, you should check the interface connection and other elements in the system.

Table 4-1 Troubleshooting Hints

Symptom	Check
Power Lamp fails to light.	Power cord and connection. Fuse, replace if bad.
Printer fails to operate.	Circuit boards are installed, refer to paragraph 1.7.
Interface cable fails to connect.	Interface cable and circuit board, refer to paragraph 1.7 or 1.11.
Printer will not initialize.	Carriage for easy side to side movement. Power cord and connection. Memory Circuit Board.
Paper feed problem.	Paper path for obstruction. Forms tractor for correct side to side settings. Paper Release Lever for correct location.
Print is light.	Ribbon, replace if worn. Paper Thickness Lever.
Printed characters have voids or vary in darkness.	Paper, ribbon and Platen. Paper Thickness Lever. Print head wear causing missing dots.
Poor print quality.	Paper Thickness Lever and ribbon cassette.

Table 4-1 Troubleshooting Hints (Continued)

Symptom	Check
Will not print.	If the PAPER OUT lamp is lit, check the paper path and sensor. If the ribbon is correctly installed between the print head and Platen. If ON LINE lamp is lit. A setting of DIP switch 2-1, print head connector cable. Also check the interface connector and cable.
Incorrect characters printed.	DIP switch settings. Host system Control Code or Data code may not agree with the printer's DIP switch settings.
Ribbon breaks or jams.	Installation of ribbon and Paper Thickness Lever.
Extra line feed, or no line feed.	DIP Switch-2 #4 (Line Feed with Carriage Return) see **Section 3**.
Paper jam.	Turn the Power Switch OFF, push the Paper Release Lever towards the rear of the printer, and carefully pull the paper out of the paper path. Confirm that the paper satisfies the paper specifications.

4.5 REPLACING FUSE

The replacement procedure is as follows:

1. Unplug the power cord. (Turning the Power Switch to OFF is not sufficient.)

2. Turn the fuse holder counterclockwise while pushing it with screwdriver to spring out the fuse holder, and remove the holder together with the blown fuse.

3. Put a same type and rating of fuse into the fuse holder.

4. Turn the fuse holder into the socket.

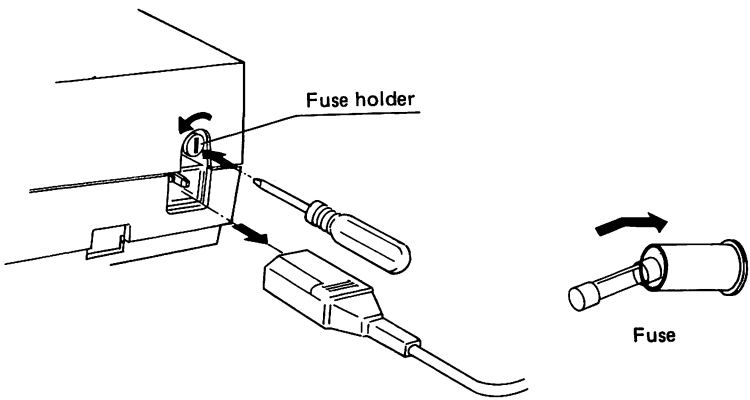


Figure 4-2 Replacing Fuse

(For German users)

Austausch der Sicherung

Die Sicherung wird wie folgt ausgetauscht;

1. Das Netzkabel aus der Steckdose ziehen (einfaches Ausschalten des Gerates reicht nicht aus).

2. Den Sicherunghalter drucken und gleichzeitig mit einem Schraubenzieher gegen den Uhrzeigereinn drehen und den Halter zusammen mit der druchgebrannten Sicherung entnehmen.

3. Eine neue Sicherung mit gleichem Typ und Nennwert einlegen.

4. Die Sicherung in die Halterung einstecken.

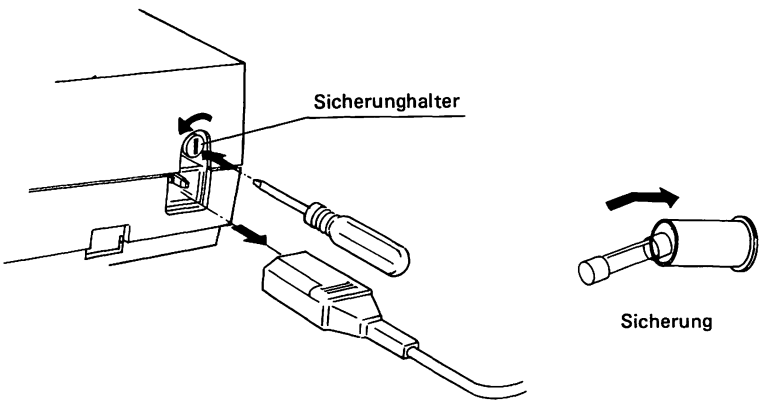


Abb. 4-2 Austausch der Sicherung

4.6 REPACKING YOUR PRINTER

Refer to **Figure 1-1** and the instructions on the shipping carton.

Use the carton and packing material supplied with the printer if you have to store or transport your printer.

Turn computer and printer power OFF.

Remove the interface cable, power cord, ribbon cassette and Rear Cover. Place these items in plastic bags and put them in the accessory tray.

Clean the printer, if required.

Position the print head at the center of the print line and install the shipping restraint to prevent the print head from moving. See paragraph 1.3.

Close the front and top covers. Insert the support material into the soundproof cover and tape it to the printer as shown in **Figure 4-3**.

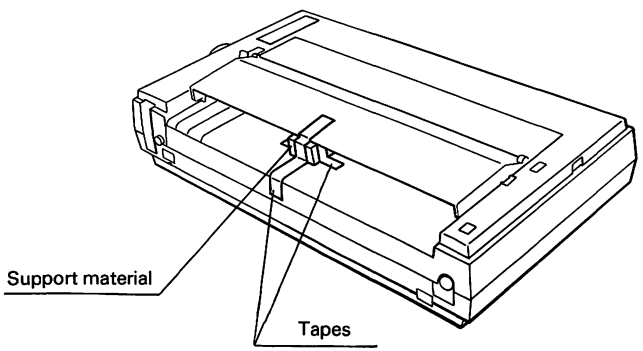


Figure 4-3 Taping the Support Material

Put the printer into its plastic bag.

Install the polystyrol pads on each side of the printer and slide it into the shipping carton.

Place the printer accessory tray in the shelf space in the shipping carton.

Close the flaps on the shipping carton.

Secure the shipping carton with the two plastic handles to complete the packing procedure.

SECTION 5
COMMAND SET

5.1 COMMAND OVERVIEW

This section is written for reference. A programmers manual with additional information is available. Consult your authorized Dealer for availability.

Most users will operate with application software and will not use the information in this section.

Specify your printer as an Epson FX-80 or JX-80 in your application software installation procedure and your printer will interact correctly with your system.

Commands, in the form of Control Codes or Escape Code sequences, cause the printer to:

Exchange, store and print data
Establish and reset different print modes (Double-Width, Condensed, Emphasized, Underscore, etc.)
Format the printer's output
Control other functions performed by the printer

When a command specifies a change to a DIP switch setting, the DIP switch setting is over-ridden.

The host computer sends commands (and data) to the printer via the interface, under software control. For example a LPRINT statement (in BASIC) allows entry of a command. The LPRINT statement can use the following formats to send information to the printer:

LPRINT "w"	ASCII Character
LPRINT CHR$(119)	Decimal character
LPRINT CHR$(&H77)	Two digit Hexadecimal character

Refer to your programmer or computer manual for additional information.

If your system does not respond to a NUL, SOH or STX, replace the value with decimal value 0, 1 or 2.

5.2 PRINT MODE COMMANDS

Printing mode is changed with one of the commands in **Table 5-1**. Each print mode is effective until another print mode command is received. The print mode set by the DIP switches (when power is turned ON) is used until a print mode command is received.

Table 5-1 Print Mode Commands

Function	Set	Reset
Double Width Print	ESC W SOH	ESC W NUL
Until reset		ESC ! (n)
Double Width Print by print line	SO ESC SO	DC4, LF, FF, VT, ESC ! (n) ESC W NUL
Condensed Printing	ESC SI or SI	DC2 or ESC ! (n)
Double Strike	ESC G	ESC H
Emphasized	ESC E	ESC F
Underline	ESC - SOH	ESC - NUL
Superscript	ESC S NUL	ESC T
Subscript	ESC S SOH	ESC T
Italics	ESC 4	ESC 5
Proportional spacing	ESC p SOH	ESC p NUL
Various Print Modes	ESC ! (n)	ESC ! (n)

Hexadecimal A0 to FE are always printed in Italics.

Condensed printing is not supported with 15 CPI.

Emphasized and Proportional Spacing are used only with Pica Pitch (10 CPI).

Emphasized printing always sets Proportional spacing, which can be reset with ESC F.

Print Example:

Double-width Printing

Condensed Printing

Double-strike Printing

Emphasized Printing

Underline printing

Superscript Subscript

Italic ABCDEFGHIJKLMNOPQRSTUVWXYZ

Proportional

Proportional (Reset Emphasized Mode)

5.3 HORIZONTAL MOVEMENT COMMANDS

The print head is controlled and positioned with the Horizontal Movement Command shown in **Table 5-2**. Pitch is changed when a new pitch command is received.

Table 5-2 Horizontal Movement Commands

Function	Set	Reset
Space	SP	None
Backspace	BS	None
Carriage Return	CR	None
Elite Pitch (12 CPI)	ESC M	By New Pitch
Pica Pitch (10 CPI)	ESC P	By New Pitch
15 CPI (Pitch)	ESC m	By New Pitch
Absolute Print Position	ESC $ (n1) (n2)	None
Relative Print Position	ESC \ (n1) (n2)	None
Character Spacing	ESC SP (n)	None

Backspace (BS) cannot be used with Proportional Space.

Carriage Return (CR) causes a Line Feed if DIP Switch-2 #4 is ON, or if $\overline{\text{AUTO FEED XT}}$ signal is set true.

Absolute Print Position (ESC $) is specified from the left margin as (256 x (n2) + (n1)) x 1/60".

Relative Print Position (ESC \) is specified from the current position as (256 x (n2) + (n1)) x 1/120".

Character Spacing (ESC SP) does not support 12 and 15 pitch in the draft mode, it is supported in NLQ mode.

Print Example:

```
Pica-pitch printing

Elite-pitch printing

15 CPI-pitch printing
```

5.4 VERTICAL MOVEMENT COMMANDS

Paper movement is controlled and positioned with the Vertical Movement Commands in **Table 5-3**. Line Spacing is changed when a New Line Spacing command is received.

Table 5-3 Vertical Movement Commands

Function	Set	Reset
Form Feed	FF	None
Line Feed	LF	None
Line Feed of (n)/216"	ESC J (n)	None
Negative Line Feed of (n)/216"	ESC j (n)	None
1/8" Line Spacing	ESC 0	By New Line Space
7/72" Line Spacing	ESC 1	By New Line Space
1/6" Line Spacing	ESC 2	By New Line Space
(n)/216" Line Space	ESC 3 (n)	By New Line Space
(n1)/72" Line Space	ESC A (n1)	By New Line Space

(n) is an ASCII character with a binary value between 0 and 255.

(n1) is an ASCII character with a binary value between 0 and 85.

Do not perform an ESC j (n) (Negative Line Feed) as shown in **Figure 5-1**:

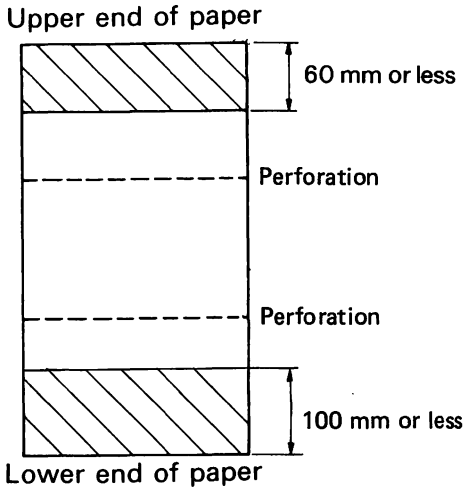
Within 60mm at start of form

Within 100mm at end of form

Within 60mm of leading edge of cut sheet paper

Within 40mm of trailing edge of cut sheet paper

With fanfold paper



With cut-sheet paper

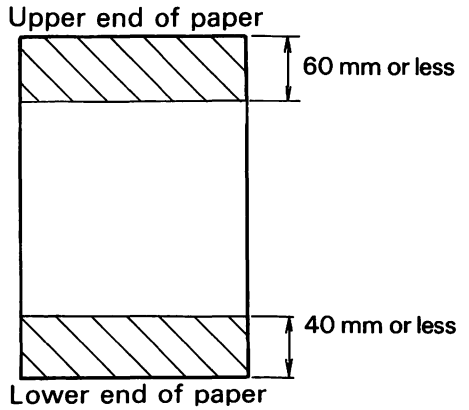


Figure 5-1 Reverse-feed-prohibited Area

5.5 HORIZONTAL TABBING COMMANDS

Absolute and relative Horizontal Tab Stops are controlled with the commands given in **Table 5-4**. Horizontal Tab Stops can be set in up to 32 ascending positions, with position 1 as the left margin.

Table 5-4 Horizontal Tab Stop Commands

Function	Set	Reset
Set Horizontal Tab Stops	ESC D (n1) ... (nk) NUL	ESC I
Horizontal Tab Execution	HT	None

5.6 VERTICAL TABBING COMMANDS

Vertical Tab Stops are controlled with the commands given in **Table 5-5**. Up to 16 Vertical Tab Stops can be set, and up to 8 Channels, from 0-7, can be selected.

Table 5-5 Vertical Tab Stop Commands

Function	Set	Reset
Set Vertical Tab Stops	ESC B (n1) ... (nk) NUL	ESC C
Vertical Tab Execution	VT	None
Set Vertical Tabs in VFU	ESC b (n1) ... (nk) NUL	ESC C
Set VFU Channel	ESC / (n)	None

5.7 PAGE FORMATTING COMMANDS

Commands shown in **Table 5-6** set the Left, Right, Top and Bottom margins.

Table 5-6 Page Formatting Commands

Function	Set	Reset
Set Right Margin	ESC Q (n)	New Margin
Set Left Margin	ESC I (n)	New Margin
Set Skip over Perforation	ESC N (n)	–
Set Page Length to (n) Lines	ESC C (n)	New Length
Set Page Length to (n) Inches	ESC C NUL (n)	New Length

Left and right margins vary with pitch and printer model number as indicated in **Table 5-7**.

Table 5-7 Left and Right Margins

Margin	Pitch	From:	To:
Right	PICA (10)	Left Margin +2	80 – 80-column printer 136 – 136-column printer
Right	ELITE (12)	Left Margin +3	96 – 80-column printer 163 – 136-column printer
Right	Condensed	Left Margin +4	*137 – 80-column printer 233 – 136-column printer
Left	PICA (10)	Column 0	Right Margin -2
Left	ELITE (12)	Column 0	Right Margin -3
Left	Condensed	Column 0	Right Margin -4

***Note:** 132 characters can be printed in condensed mode when the printer first turned on.

5.8 LANGUAGE SELECTION COMMANDS

The language selected by Memory Circuit Board DIP switch 1 positions #6, #7 and #8 is changed with the command shown in **Table 5-8**.

Table 5-8 Language Selection Command

Function	Set	Reset
Set Language Designated by (n)	ESC R (n)	New Language Selection

Table language designated by (n) is shown in **Table 5-9**.

Table 5-9 Language Selected by (n)

Selected Language	Value of (n)
U.S.A.	0
French	1
German	2
English	3
Danish	4
Swedish	5
Italian	6
Spanish	7
Japanese	8
Norwegian	9
Danish II	A

Print Example:

```
n= 0
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
n= 1
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_
`abcdefghijklmnopqrstuvwxyzéùè¨
n= 2
!"#$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_
`abcdefghijklmnopqrstuvwxyzäöüß
n= 3
!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
n= 4
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZÆØÅ^_
`abcdefghijklmnopqrstuvwxyzæøå~
n= 5
!"#¤%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_
éabcdefghijklmnopqrstuvwxyzäöåü
n= 6
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ°\é^_
ùabcdefghijklmnopqrstuvwxyzàòèì
n= 7
!"₧$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ¡Ñ¿^_
`abcdefghijklmnopqrstuvwxyz¨ñ}~
n= 8
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[¥]^_
`abcdefghijklmnopqrstuvwxyz{|}~
n= 9
!"#¤%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÆØÅÜ_
éabcdefghijklmnopqrstuvwxyzæøåü
n= 10
!"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÆØÅÜ_
éabcdefghijklmnopqrstuvwxyzæøåü
```

5.9 BIT IMAGE GRAPHICS COMMANDS

Bit images are structured by dots arranged in rows and columns. Eight dots arranged in a column is a pattern byte. The smallest unit of the bit image (one column) is called a pattern element. There are 8-dot and 9-dot pattern elements.

Refer to the Programmer's Manual for details on Bit Image Graphics.

Bit Image Graphic commands are shown in **Table 5-10**.

Table 5-10 Bit Image Graphics Commands

Function	Set
8-dot Image Mode	ESC * (m) (n1) (n2) (p1) (p2) ... (pk)
9-dot Image Mode	ESC ^ (m) (n1) (n2) (p1) (p2) ... (pk)
Single Density Image	ESC K (n1) (n2) (p1) (p2) ... (pk)
Double Density Image	ESC L (n1) (n2) (p1) (p2) ... (pk)
Double Density & Double Speed Image	ESC Y (n1) (n2) (p1) (p2) ... (pk)
Quadruple Density Image	ESC Z (n1) (n2) (p1) (p2) ... (pk)
Convert Image Mode	ESC ? (n) (m)

Values of (m) for 8-dot and 9-dot image modes are shown in **Tables 5-11** and **5-12**.

Table 5-11 8-Dot Image (m) Values

(m)	Mode
0	Single Density
1	Double Density
2	Double Density & Double Speed
3	Quadruple Density
4	CRT I
5	Plotter
6	CRT II
7	Double Density Plotter
8	Triple Density

Table 5-12 9-Dot Image (m) Values

(m)	Mode
0	Single Density
1	Double Density

Image Elements are shown in **Table 5-13**.

Table 5-13 Dot Image Elements

	8-Dot Image Elements	9-Dot Image Elements
Consists of:	8 dots	9 dots
Represented by:	1 byte of data	2 bytes of data

Print Example:

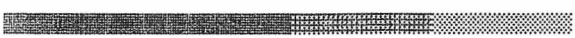
8-dot image mode

m= 0

m= 1

m= 2

m= 3

m= 4

m= 5

m= 6

m= 7

m= 8

9-dot image mode

m= 0

m= 1

5.10 DOWNLOAD COMMANDS

Download commands are shown in **Table 5-14**.

Refer to the Programmer's Manual for details on how to design and print downloaded symbols and characters.

Table 5-14 Download Commands

Function	Set
Select Internal Character Set	ESC % NUL NUL
Select Download Character Set	ESC % SOH NUL
Select NLQ Character Set	ESC % STX NUL or ESC x SOH
Reset NLQ Character Set	ESC x NUL (to reset NLQ)
Copy Character Set	ESC : NUL NUL NUL
Define Download Characters/Symbols	ESC & NUL (n) (m) (a) (p1) (p2) up to (p11)
Define NLQ Download Characters/Symbols	ESC & SOH (n) (m) (a1) (a2) (p1) (p2) up to (p48)

If your system does not respond to NUL, SOH or STX replace these values with decimal values 0, 1 or 2.

Print Example:

Internal character set

ABCDEFGHIJKLMNOPQRSTUVWXYZ

NLQ character set

ABCDEFGHIJKLMNOPQRSTUVWXYZ

5.11 COLOR SELECTION COMMANDS

When power is turned ON, the default color is black. If the color option and a color ribbon is installed when a color selection command is received the ribbon is shifted and subsequent images are printed in the color specified by (n).

If the color option and a black ribbon (with ribbon cassette support tabs) is installed each color selection command will cause the ribbon motor to rotate but the ribbon will not shift and all images will be printed in black.

The selected color is changed when a Color Selection command, shown in **Table 5-15**, is received.

Table 5-15 Color Selection Command

Function	Set
Select Ribbon Color	ESC r (n)

The color selected by (n) is shown in **Table 5-16**. Additional colors, not shown in **Table 5-16**, may be blended in unidirectional print mode (ESC U SOH).

Table 5-16 Ribbon Color Selected by (n)

Value of (n)	Color	First Pass	Second Pass
0	Black	Black	—
1	Magenta	Magenta	—
2	Cyan	Cyan	—
3	Violet	Magenta	Cyan
4	Yellow	Yellow	—
5	Orange	Yellow	Magenta
6	Green	Yellow	Cyan

5.12 MISCELLANEOUS COMMANDS

Miscellaneous commands are shown in **Table 5-17**.

Refer to the Programmer's Manual for details on these commands.

Table 5-17 Miscellaneous Commands

Function	Set	Reset
Select Printer*	DC1	DC3
Sound Buzzer (Alarm)	BEL	None
Cancel Data on Print Line	CAN	None
Delete (not used with PS)	DEL	None
Move Print Head to Home	ESC <	–
Set MSB to "0"	ESC =	ESC #
Set MSB to "1"	ESC >	ESC #
Enable Paper-End Sensor	ESC 9	ESC 8
Set Typewriter mode	ESC i SOH	ESC i NUL
Print Code Area Expansion	ESC 6	ESC 7
Print Undefined Codes	ESC I SOH	ESC I NUL
Half Speed Printing	ESC s SOH	ESC s NUL
Reset Printer	ESC @	
Unidirectional Print	ESC U SOH	ESC U NUL
Repeat Data	ESC V (n) (d1) (d2) to (dm) ESC V NUL	–

* DC1/DC3 enabled if DIP switch-2 #1 is OFF and the interface signal SLCT IN is high when power is turned ON.

Table 5-18 indicates Undefined Control Characters (in the ESC I SOH command) with an *.

Table 5-18 Undefined Control Characters

Hex Value	ASCII Code	Printer Code	Binary Value
00 80	NUL	*	x000 0000
01 81	SOH	*	x000 0001
02 82	STX	*	x000 0010
03 83	ETX	*	x000 0011
04 84	EOT	*	x000 0100
05 85	ENQ	*	x000 0101
06 86	ACK	*	x000 0110
07 87	BEL	BEL	x000 0111
08 88	BS	BS	x000 1000
09 89	HT	HT	x000 1001
0A 8A	LF	LF	x000 1010
0B 8B	VT	VT	x000 1011
0C 8C	FF	FF	x000 1100
0D 8D	CR	CR	x000 1101
0E 8E	SO	SO	x000 1110
0F 8F	SI	SI	x000 1111
10 90	DEL	*	x001 0000
11 91	DC1	DC1	x001 0001
12 92	DC2	DC2	x001 0010
13 93	DC3	DC3	x001 0011
14 94	DC4	DC4	x001 0100
15 95	NAK	*	x001 0101
16 96	SYN	*	x001 0110
17 97	ETB	*	x001 0111
18 98	CAN	CAN	x001 1000
19 99	EM	*	x001 1001
1A 9A	SUB	*	x001 1010
1B 9B	ESC	ESC	x001 1011
1C 9C	FS	*	x001 1100
1D 9D	GS	*	x001 1101
1E 9E	RS	*	x001 1110
1F 9F	US	*	x001 1111

x: When 00 to 1F, 0
When 80 to 9F, 1

APPENDIX A
COLOR KIT INSTALLATION

A.1 OPTIONAL COLOR KIT

The optional color kit can be ordered when you order your printer, and is also available as a separate item from your dealer.

If the color kit is ordered with the printer it will be shipped with the printer, for you to install.

The color kit includes:

Ribbon Shift Unit — shifts the four-color ribbon cassette to place the selected color in front of the print head. The unit consists of the motor with a cam and a cable which carries drive signals from the driver board to the motor.

Ribbon Cassette — loads with a four-color ribbon (black, magenta, cyan and yellow).

A.2 INSTALLATION OF COLOR KIT

Proceed as follows to install the color kit.

1. Make sure your computer and printer are turned off.
2. Open the top cover and remove the ribbon cassette.

3. Slide the carrier frame to the right side and loosen the two screws on the carrier frame.

4. Insert the color kit flat-conductor cable into the space between the print head and the carrier frame.

5. Install the color kit and tighten the two screws.

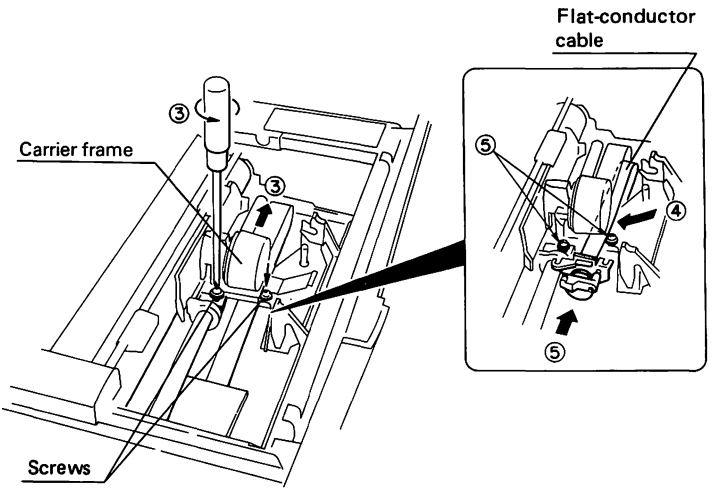


Figure A-1 Installation of the Color Kit (1)

6. Slide the connector cover towards the right and remove it.

7. After unlocking the connector for the color kit, insert the flat-conductor cable into the connector. Lock the connector and attach the connector cover.

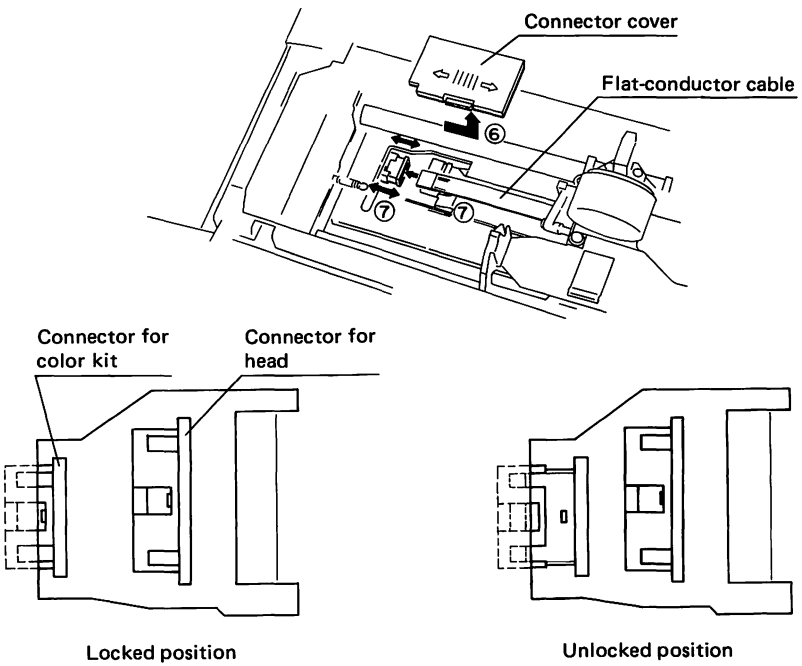


Figure A-2 Installation of the Color Kit (2)

Install the color ribbon cassette, referring to paragraph 2.2.

This completes the installation of the color kit.

Consult your dealer if assistance is required.

APPENDIX B
CIRCUIT BOARDS

B.1 EXCHANGEABLE CIRCUIT BOARDS

Refer to paragraph 1.7 for summary information on the installation of these circuit boards.

This printer allows the user to exchange the Interface Circuit Board and the Memory Circuit Board. These boards are located beneath the Circuit Board Cover at the right rear corner of the printer.

The Interface Circuit Board contains either a RS-232C Serial or a Centronics Type Parallel Interface. The board contains the interface circuits and the interface cable receptacle (which is exposed at the rear of the printer). Only the Serial Interface Circuit Board has the DIP switches.

The Memory Circuit Board contains RAM and ROM memory and the DIP switches set by the user to establish default print parameters.

RAM Memory Circuit Boards are offered:

With 8K bytes of RAM Memory
With 16K bytes of RAM Memory

At least 8K bytes of RAM memory are recommended before installing an optional Color Kit, and 16K bytes is preferred, to achieve printing speed. 2.4K bytes of RAM are installed on the Main Circuit Board for user use with the 80-column printer while, with the 136-column printer, RAM is set for addressing additional print columns.

B.2 INSTALLATION OF A CIRCUIT BOARD

To install a circuit board, proceed as follows.

Make sure the Power Switch is turned OFF.

Refer to **Figure B-1**.

1. Loosen the Card Cover holding bolt with a screw driver or coin.
2. Remove the cover by sliding it rearward while raising it upward.
3. Carefully align the circuit board into its guide slots and push it downward until the connector is fully seated.
4. If installing an Interface Board, tighten the mounting screw to ensure an electrical ground.
5. Install the Card Cover and fasten the holding bolt.

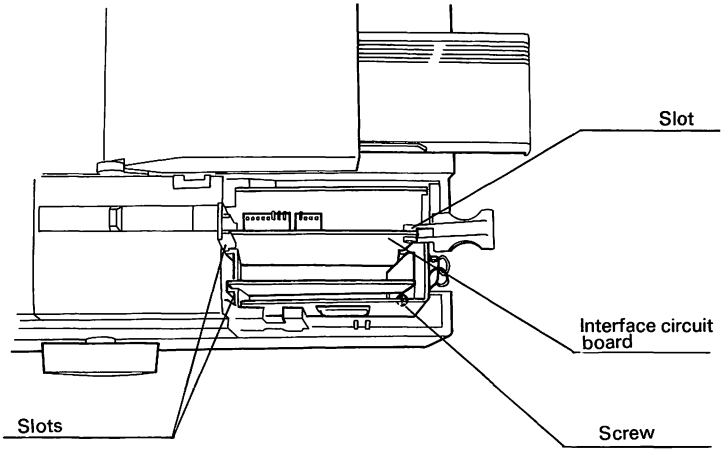


Figure B-1 Circuit Board Installation

APPENDIX C
CUT SHEET FEEDER

An optional Cut Sheet Feeder is available from your dealer. This section gives the model numbers of the currently supported Sheet Feeders. Installation and operation information is also given.

C.1 SUPPORTED MODELS

Your printer can be equipped with the following model number Cut Sheet Feeders.

ASF300-FJ2101	Single Bin unit for the 80-column printer
ASF300-FJ2201	Single Bin unit for the 136-column printer

These Cut Sheet Feeders are produced by BDT (Büro und Datentechnick).

Consult your dealer for additional performance data on available Sheet Feeders.

C.2 CUT SHEET FEEDER INSTALLATION

1. Turn off the printer Power Switch.

2. Open the soundproof,front and top covers.

3. Push downward on the rear end of the Cut Sheet Feeder cover and then remove the cover by raising upward as shown in **Figure C-1**.

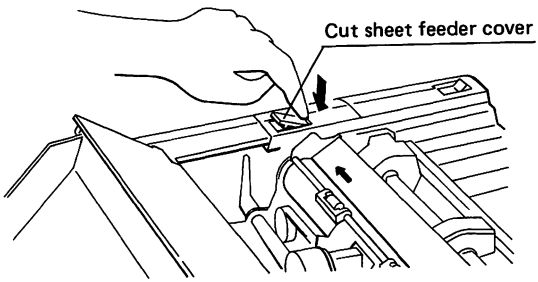


Figure C-1 Removing the Cut Sheet Feeder Cover

4. Remove the rear cover.

5. Remove Bail Roller Unit as follows.

> **NOTE:**
> There are two kinds of the Bail Roller Unit. One is made of metal and another is made of plastic.

(a) When your printer has metal Bail Roller Unit, push the right and left hook levers of the Bail Roller Unit rearward until the whole unit rotates about 90 degrees, and then pull it upward to remove as shown in **Figure C-2.1.**

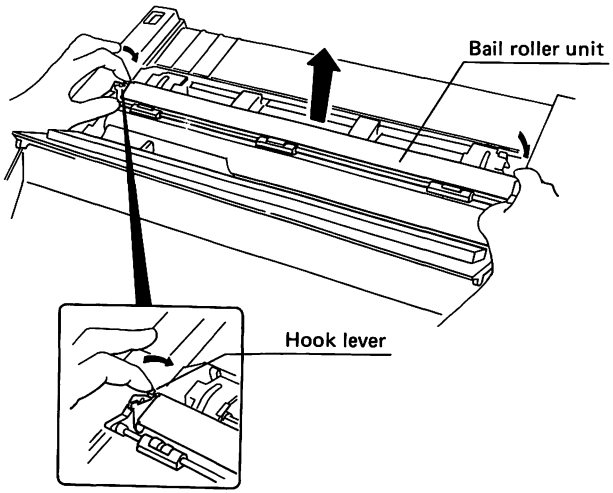


Figure C-2.1 Removing Bail Roller Unit

(b) When your printer has plastic Bail Roller Unit, rotate this unit toward the front of the printer to snap it out, and then pull it upward to remove as shown in **Figure C-2.2.**

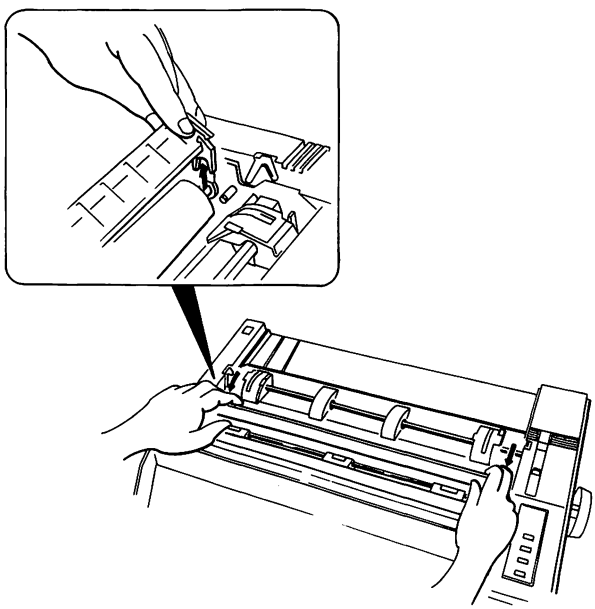


Figure C-2.2 Removing Bail Roller Unit

6. Set DIP switch 2-2 to ON as in paragraph 1.5 and remount the card cover.

> **NOTE:**
> If necessary, change the setting of DIP switch 1-5 according to the paper length.

7. Re-install the rear cover and move Guides to the center of the rear cover as shown in **Figure C-3**.

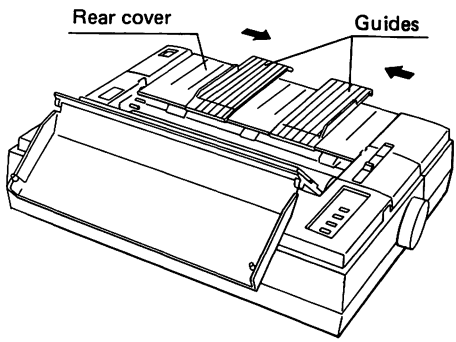


Figure C-3 Install Rear Cover

8. Remove the Cut Sheet Feeder from the package and remove the Paper Stacker from the Cut Sheet Feeder as shown in **Figure C-4**.

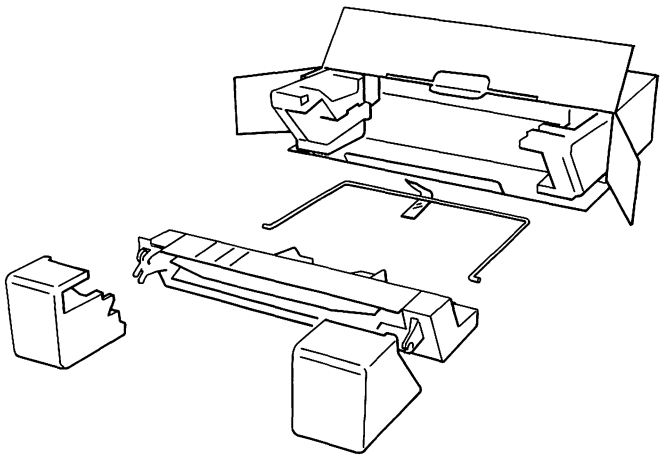


Figure C-4 Removing the Cut Sheet Feeder

9. Install the Cut Sheet Feeder on the printer, so the adaptor of the Sheet Feeder's clamps fit over the studs on the printer as shown in **Figure C-5**.

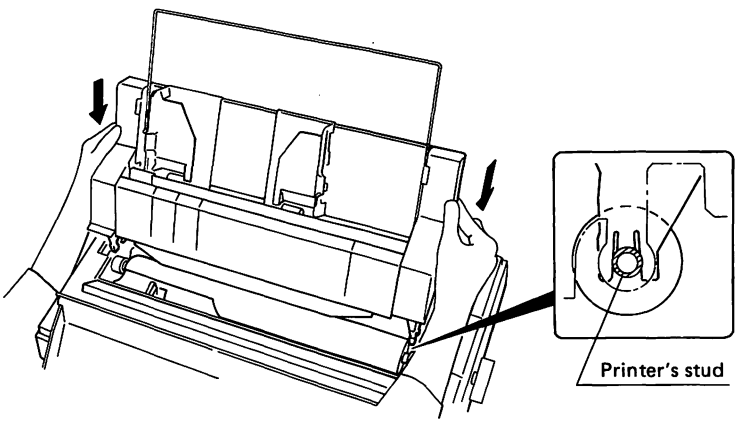


Figure C-5 Installation of Cut Sheet Feeder

10. Put the front covers against the front face of the Cut Sheet Feeder as shown in **Figure C-6**.

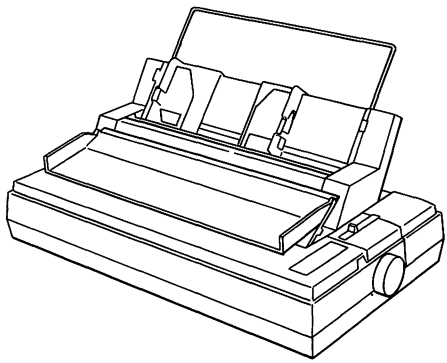


Figure C-6 Setting the Front Cover

11. Set the Paper Release Lever towards the front of the printer.

12. Turn on the Power Switch.

C.3 LOADING PAPER

1. Place the Paper Stacker, for the length of paper being used, into the holes in the Feeder.

2. Push the Feeder's tabs by gripping the whole part and open the paper bin as shown in **Figure C-7**.

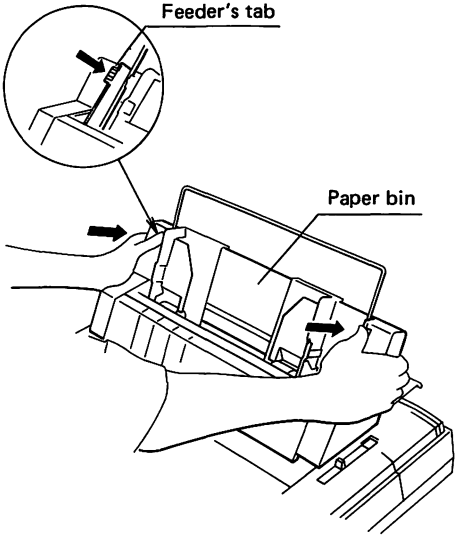


Figure C-7 Opening the Paper Bin

NOTE:
Do not try to open the paper bin as shown in **Figure C-8**.

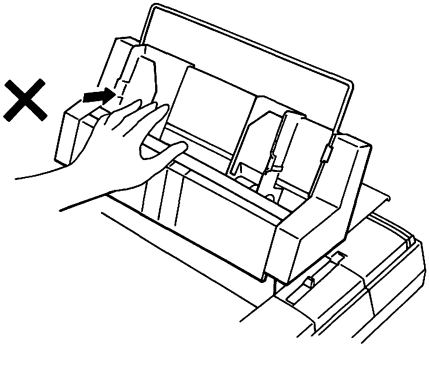


Figure C-8 Prohibited Operation

3. Adjust the width of the bin for the paper being used.

4. Fan the paper well as shown in **Figure C-9** and align the edges before placing it on the Paper Stacker.

   Letterhead paper is loaded with the printed face towards the rear of the bin and with the top edge down.

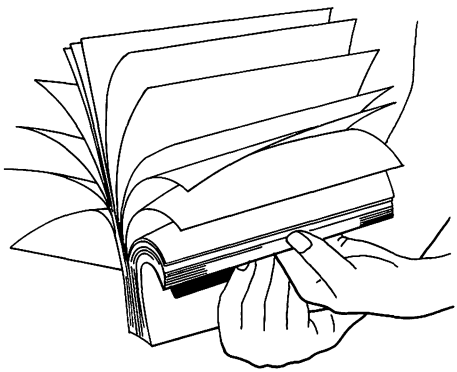


Figure C-9 Fanning the Paper

5. Load paper.

6. Close the paper bin by pushing the Paper Stacker and clamp as shown in **Figure C-10**.

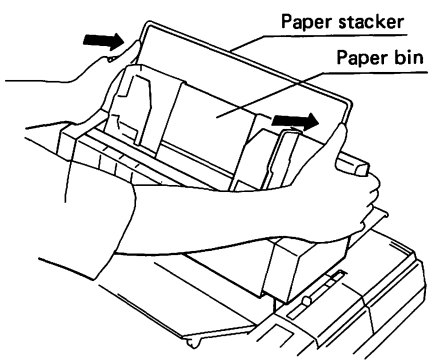


Figure C-10 Closing the Paper Bin

7. Press the FF switch to feed the first sheet of the paper to its first print line (Top of Form).

   The printer will feed subsequent sheets to this Top of Form position.

C.4 OPERATION

Paper will advance through the printer:

When a paper feed command is received from the host system.

When the Platen Knob is turned.

When the LF switch is pressed on the Operator Panel while the printer is OFF LINE.

Loaded cut sheet paper is ejected from the Sheet Feeder when the FF switch on the Operator Panel is pressed.

If the paper bin runs out of paper, the "PAPER OUT" lamp on the Operator Panel will light.

To resume printing after a Paper Out condition:

Insert paper into the empty bin according to paragraph C.3.

Press the FF switch on the Operator Panel.

Paper will load and the "PAPER OUT" lamp will go out.

Press the ON LINE switch to continue printing.

C.5 CUT SHEET FEEDER REMOVAL

1. Turn off the Power Switch and open the front cover.

2. Pull the Cut Sheet Feeder upward and lift it off the printer as shown in **Figure C-11**. Remove the rear cover.

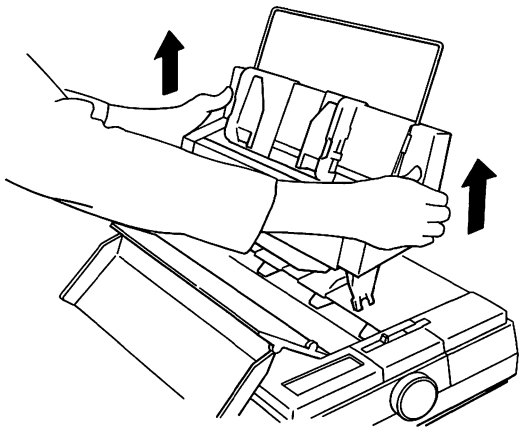


Figure C-11 Removing the Cut Sheet Feeder

3. Install the Bail Roller Unit according to the following procedure.

> **NOTE:**
> There are two kinds of the Bail Roller Unit. One is made of metal and another is made of plastic.

(a) When your printer has metal Bail Roller Unit,

(1) Set the slot of the left bracket of the Bail Roller Unit into the groove of the rear-left stud of the printer and set the slot of the right bracket into the rear-right stud as shown in **Figure C-12**.

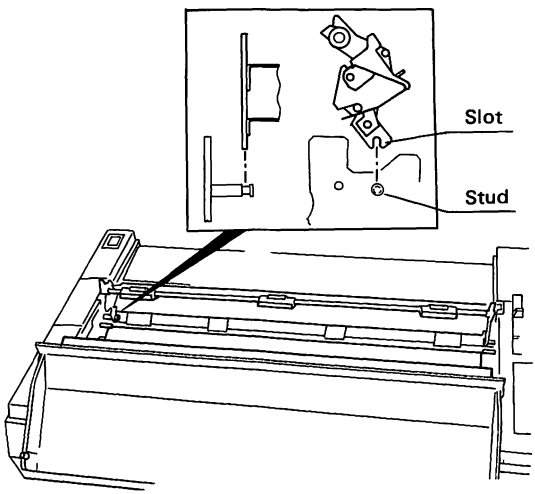


Figure C-12 Installation of the Bail Roller Unit

(2) Turn the Bail Roller Unit in the direction of the arrow as shown in **Figure C-13** until the unit is locked by the printer's front studs in the reverse order of paragraph C.2-#5.

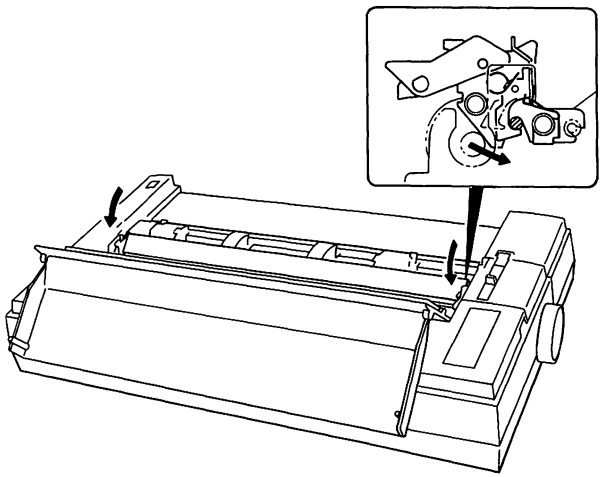


Figure C-13 Fixing the Bail Roller Unit

(b) When your printer has plastic Baill Roller Unit,

(1) Set the slot of the Bail Roller Unit onto the studs which support the platen as shown in **Figure C-14.**

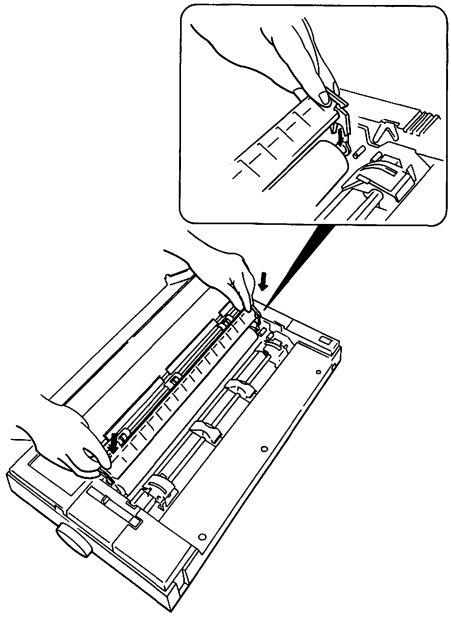


Figure C-14 Installation of the Bail Roller Unit

(2) Rotate the Bail Roller Unit to the direction of **Figure C-15** until it is locked by the printer front studs.

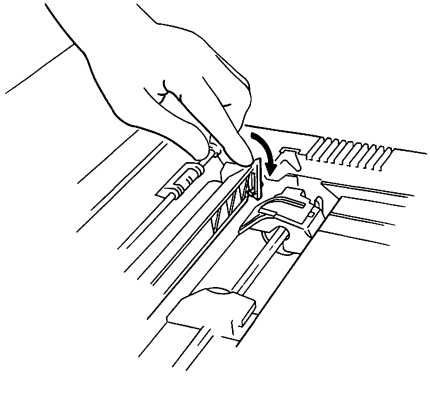


Figure C-15 Fixing the Bail Roller Unit

5. Set DIP switch 2-2 OFF.

6. Re-install the rear cover and the Cut Sheet Feeder cover, and close the soundproof, top and front covers.

C.6 PAPER SPECIFICATIONS

1. Paper dimensions

		2101	2201
Length	Max.	12" (305 mm)	12" (305 mm)
	Min.	5" (127 mm)	5" (127 mm)
Width		8.5" (216 mm) (A4 portrait)	14.4" (365 mm) (B4 landscape)
	Min.	5.7" (145 mm)	5.7" (145 mm)

2. Paper weight

   Max. 20 lbs (81 g/m^2)
   Min. 15 lbs (60 g/m^2)

3. Details

   Refer to the Operator's Manual ASF300-FJ2101/2201 in the Cut Sheet Feeder package.

APPENDIX D
PRINTER SPECIFICATIONS

Print Method:
Impact dot matrix with a 9-wire print head

Printing Speed:
Draft Quality mode prints 220 characters per second at 10 CPI and 176 characters per second at 12 CPI

Condensed mode prints 188 characters per second at 17.1 CPI

Near Letter Quality mode prints 44 characters per second at 10 CPI

Line Feed Speed:
100 milliseconds at 6 lines per inch

Form Feed Speed:
4 inches per second

Character Matrix (Horizontal x Vertical):
Draft Quality is 9 x 7 dots

Near Letter Quality is 19 x 16 dots

Character Set:
96 ASCII characters, 32 international characters

96 + 32 Italic characters

256 Near Letter Quality characters

Downloadable Characters:
Contains storage space for up to a 255-character set and a 64-character Near Letter Quality Set.

Character Spacing:
1/10", 1/12", 1/15", 1/17.1", 1/20", Proportional space, and programmable increments of 1/120"

Print Line:

80-column printer	80 Characters per line at 10 CPI
	96 Characters per line at 12 CPI
	120 Characters per line at 15 CPI
	137 Characters per line at 17.1 CPI
	160 Characters per line at 20 CPI
136-column printer	136 Characters per line at 10 CPI
	163 Characters per line at 12 CPI
	204 Characters per line at 15 CPI
	233 Characters per line at 17.1 CPI
	272 Characters per line at 20 CPI

Line Spacing:
1/6", 1/8", 7/72", n/72" or n/216"

Number of copies:
Up to 3, including the original

Forms:

80-column printer	Up to 0.011" thick
	4" (101.6 mm) to 10" (257 mm) wide Cut Sheets
	4" (101.6 mm) to 10.5" (266.7 mm) wide Continuous Forms
136-column printer	Up to 0.011" thick
	4" (101.6 mm) to 15" (420 mm) wide Cut Sheets
	4" (101.6 mm) to 16.5" (419.1 mm) wide Continuous Forms

Ribbon:
Monochrome fabric ribbon or 4-color fabric ribbon in an easily installed cassette

Paper Handling:
Friction feed Platen and rear feed continuous forms tractors are standard

Auto Load:

Auto Load with cut sheet paper and with the 136-column printers a paper less than 8.5" wide.

The 80-column printer will also Auto Load continuous forms, (which is not available on the 136-column printer)

Cut Sheet Feeder:

Available as an option, see **Appendix C**.

Interface:

Mounted on user exchangeable circuit board

Centronics Type Parallel and RS-232C Serial Interface Circuit Boards are available

AC Power:

115 VAC to 120 VAC ±10%, 50/60 Hz
220 VAC to 240 VAC ±10%, 50/60 Hz

Operating Environmental Requirements:

5°C to 38°C, 20% to 80% RH

Storage Environmental Requirements:

–20°C to 60°C, 5% to 95% RH

Physical Dimensions:

80-column printer	Height:	4.7" (120 mm)
	Width:	17.2" (438 mm)
	Depth:	13.6" (345 mm)
	Weight:	20.2 lbs (9.2 kg)
136-column printer	Height:	4.7" (120 mm)
	Width:	22.8" (580 mm)
	Depth:	13.6" (345 mm)
	Weight:	25.7 lbs (11.7 kg)

APPENDIX E
PARALLEL INTERFACE

Your printer has a user exchangeable interface circuit board. A RS-232C Serial or Centronics Type Parallel Interface Circuit Board is presently available. Refer to paragraphs 1.7 and 1.11 for additional information.

When an interface board is installed in the printer its connector is exposed through a cutout at the rear of the printer.

This Appendix describes the Parallel Interface.

Appendix F describes the Serial Interface.

E.1 PARALLEL INTERFACE OVERVIEW

Most variations of the Centronics Type Parallel Interface can be supported by this printer.

The interface connector plug, for the cable, is an Amphenol-DDK (57FE-30360) or equivalent. **Figure E-1** illustrates the connector layout.

(Cable End)

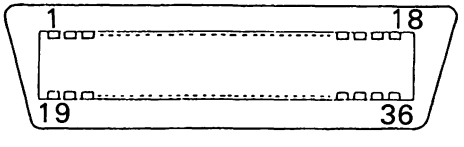


Figure E-1 Parallel Interface Connector Layout

E.2 PARALLEL INTERFACE PIN ASSIGNMENTS

Table E-1 lists the Centronics type parallel interface signals, gives the signal and return pin numbers, and defines each signal.

Table E-1 Centronics Type Parallel Interface Signal Definitions

Signal Name	Signal Pin #	Return Pin #	Signal Definition
$\overline{\text{DSTB}}$*	1	19	Low level pulse of 0.5 microsecond or more, used to strobe the DATA signals into the printer. The printer reads the data at the Low level of this signal. Ensure an -Acknowledge has been returned before issuing the next -Data Strobe. -Data Strobe is ignored if BUSY is high.
DATA 1* DATA 2* DATA 3* DATA 4* DATA 5* DATA 6* DATA 7* DATA 8*	2 3 4 5 6 7 8 9	20 21 22 23 24 25 26 27	8 data lines from the host. High level represents binary 1, Low level represents binary 0. DATA 8 is the most significant bit. Signal must be High at least 0.5 microsecond before the falling edge of the -Data Strobe signal and held at least 0.5 microsecond after the rising edge.
$\overline{\text{ACK}}$ (-Acknowledge)	10 10	28	Low level pulse of 2 to 6 microseconds indicates input of a character into the print data buffer, or the end of an operation (i.e., indicates printer has received data and is ready for the next input).

* = Signal generated by the host system.

Table E-1 Centronics Type Parallel Interface Signal Definitions (Continued)

Signal Name	Signal Pin #	Return Pin #	Signal Definition
BUSY	11	29	High level indicates printer cannot receive data. Typical conditions that cause a High BUSY level are buffer full or ERROR condition.
PE (Paper Empty)	12		High level indicates the printer is out of paper.
SLCT (Select)	13		High level indicates the printer is ON LINE (Selected).
$\overline{\text{AUTO FEED XT}}$*	14		Low level indicates LF (Line Feed) occurs after each CR (Carriage Return) code.
No Connection	15		Reserved signal line.
Signal Ground (SG)		16	Logic/Signal ground level (0 Volts).
Frame Ground (FG)		17	Printer Cabinet/Frame ground line.
No Connection	18		Reserved signal line.
Signal Ground (SG)		19-30	Twisted pair cable return lines.
$\overline{\text{INIT}}$* (-Initialize)	31		Low level pulse of 50 microseconds or more, resets the buffer and initializes the printer.
$\overline{\text{ERROR}}$	32		Low level indicates the printer is OFF LINE, has a PAPER OUT or has sensed an ERROR condition.
Signal Ground (SG)	33		Logic/Signal ground level (0 Volts).
No Connection	34		Not used.
+5 Volts Regulate	35		Connected to the +5 Volt source through a 3.3 kilo ohm resistor.

* = Signal generated by the host system.

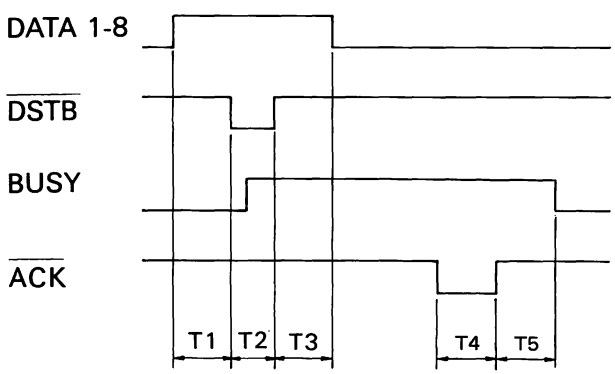
Table E-1 Centronics Type Parallel Interface Signal Definitions (Continued)

Signal Name	Signal Pin #	Return Pin #	Signal Definition
$\overline{\text{SLCT IN}}$* (-Select In)	36		Low level indicates the printer is placed ON LINE (Selected) when power is turned ON.

* = Signal generated by the host system.

E.3 PARALLEL INTERFACE SIGNAL TIMING

The timing relationship of the handshake (or protocol) signals in the Centronics Type Parallel Interface is given in **Figure E-2**.



T1 ≥0.5 microsecond
T2 ≥0.5 microsecond
T3 ≥0.5 microsecond
T4=7.0 microseconds
T5=5.0 microseconds

Figure E-2 Parallel Interface Signal Timing

E.4 PARALLEL DRIVER/RECEIVER CIRCUITS

Figure E-3 shows the parallel interface output (Driver) circuit. A SN7406 or SN74LS06 or equivalent driver circuit is used.

Figure E-4 shows the parallel interface input (Receiver) circuit. A SN74LS14 or equivalent and a 8255A receiver circuit is used. Voltage levels are 0V and +5V (nominal).

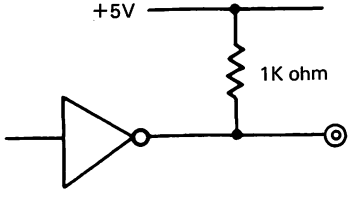


Figure E-3 Parallel Interface Output Circuit

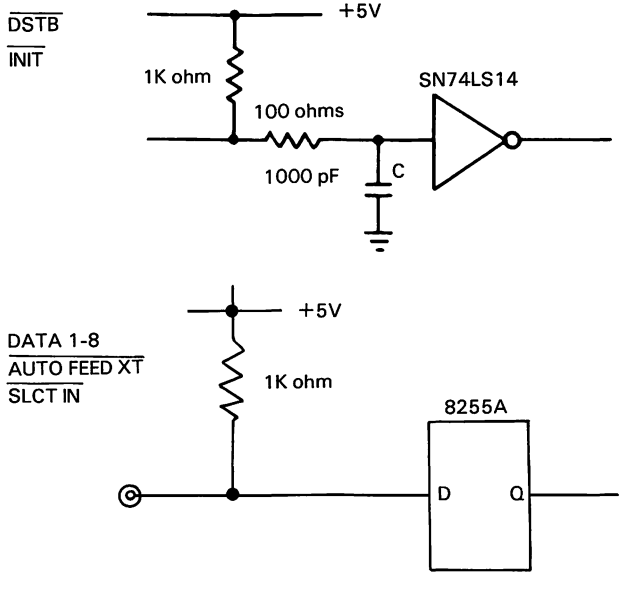


Figure E-4 Parallel Interface Input Circuit

APPENDIX F
SERIAL INTERFACE

This printer has a user exchangeable interface circuit board. A RS-232C Serial or Centronics Type Parallel Interface Circuit Board is presently available. Refer to paragraphs 1.7 and 1.11 for additional information.

When an interface board is installed in the printer its connector is exposed through a cutout at the rear of the printer.

This Appendix describes the Serial Interface.

Appendix E describes the Parallel Interface.

F.1 OVERVIEW OF SERIAL INTERFACE

The printer transmits and receives (switch selectable) 7-bit or 8-bit asynchronous data at (switch selectable) baud rates of 200, 300, 600, 1200, 2400, 4800 or 9600. The operator sets the bit configuration and baud rate with DIP switches installed on the Serial Interface Board as described in paragraphs 1.8 and 3.3.

The interface connector plug, for the cable, is a Cannon Cinch DB-25P or equivalent. **Figure F-1** illustrates the connector layout.

(Cable End)

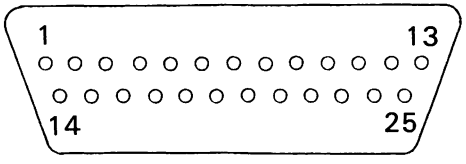


Figure F-1 Serial Interface Connector

F.2 COMMUNICATIONS PROTOCOL

A communications protocol is used, with the Serial Interface, to prevent a buffer overflow condition when print data is received faster than the printer can empty the print buffer.

The operator selects either XON/XOFF or Printer Ready/Busy Protocol, using the Serial Interface Circuit Board DIP switch #1.

The communication protocol responds to conditions within the printer as described in the following paragraphs.

F.2.1 XON/XOFF (DC1/DC3) Protocol

This protocol is selected and used when DIP switch #1, on the Serial Interface Circuit Board, is set ON.

The printer will send a DC3 control code to the host when the print buffer is nearly full (within 16 bytes).

The host system should stop transmitting data when a DC3 control code is received, and wait for the printer to send a DC1 Control Code. A DC1 control code is transmitted by the printer when its buffer can receive additional data and no error conditions exist.

When the printer is first turned on, the +DTR signal is set true, and a DC1 (XON) code is transmitted from the printer.

F.2.2 Data Terminal Ready (DTR) Protocol

This protocol is selected when DIP switch #1 on the Serial Interface Circuit Board is set OFF.

This protocol will cause the Data Terminal Ready (+DTR) interface signal to become LOW when the print buffer is nearly full (within 16 bytes)

The +DTR interface line will go high to indicate the printer is ready to receive 256 or more bytes of print data in the print buffer and no error conditions exist.

F.3 SERIAL DATA FORMAT

Serial data consists of a start bit, 7 or 8 data bits, a parity bit or without a parity bit, and 1 or 2 stop bits. A bit is in the mark (true) state when it is low and in the space (false) state when it is high.

The number of data bits, parity, and number of stop bits are DIP switch selectable (see **Section 3**).

The typical transmission of the character "K" (with 7 data bits and even parity) is shown in **Figure F-2.**

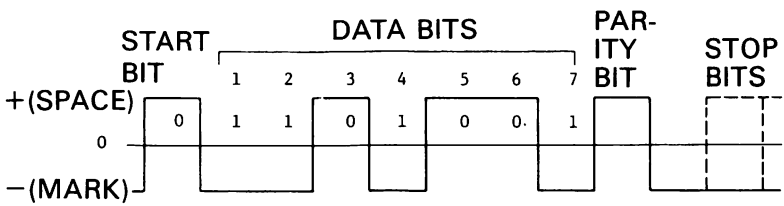


Figure F-2 Serial Data Format

F.4 SERIAL INTERFACE DRIVER RECEIVER

Figure F-3 shows the serial interface output (Driver) circuit. The printer uses a SN75188N or equivalent to convert TTL signal levels (+5 to 0 Volts) to serial interface signal levels (+12 to −12 Volts). A 1000 pF capacitor mutes noise on the output signal line.

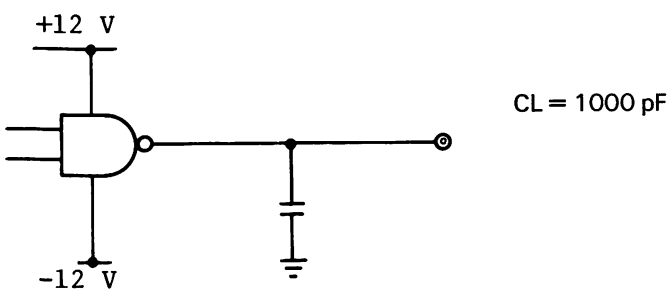


Figure F-3 Serial Interface Output Circuit

Figure F-4 shows the serial interface input (Receiver) circuit. The printer uses a SN75189AN or equivalent to convert Serial Interface signal levels (+12 to −12 Volts) to TTL signal levels (+5 to 0 Volts).

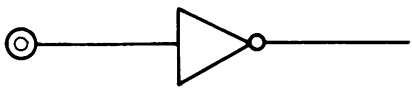


Figure F-4 Serial Interface Input Circuit

F.5 SERIAL INTERFACE PIN ASSIGNMENTS

Table F-1 lists the serial interface signals and gives the name of each signal.

Table F-1 Seiral Interface Signal Definitions

Signal	Name	Printer Pin #	CCITT	TelCo Circuit
FG	Frame Ground	1	101	AA
TD	-Transmitted Data	2	103	BA
RD	-Received Data	3	104	BB
RTS	+Request to Send	4	105	CA
CTS	+Clear to Send	5	106	CB
DSR	+Data Set Ready	6	107	CC
SC	Signal Ground	7	102	AB
DCD	+Data Carrier Detect	8	109	CF
DTR	+Data Terminal Ready	20	108	CD

Pins 9 through 19, and 21 through 25, are unused.

F.6 SIGNAL DEFINITIONS

Frame (Chassis) Ground
Safety ground.

Signal Ground
Common signal ground.

Transmitted Data
Serial data bits are sent to the host over this line.

Received Data
Serial data bits are received from the host over this line.

Request to Send
High level is sent to the host when printer initialization is complete. Request to Send stays high until power is shut off.

Clear to Send
The host sets this signal high when it is ready to receive transmitted data from the printer.

Data Set Ready
Indicates transmission and reception are enabled. The host must set this signal high when data is to be sent or received.

Data Carrier Detect
Indicates carrier signal from the host has been received. The host must set this signal high before transmitting data to the printer.

Data Terminal Ready
High state indicates that the printer is ready to receive or transmit data.

APPENDIX G
CODE TABLES

ASCII Code Chart printed in Draft quality

Code Table (U.S.A.)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	0	@	P	`	p
1		DC1	!	1	A	Q	a	q		DC1	!	1	A	Q	a	q
2		DC2	"	2	B	R	b	r		DC2	"	2	B	R	b	r
3		DC3	#	3	C	S	c	s		DC3	#	3	C	S	c	s
4		DC4	$	4	D	T	d	t		DC4	$	4	D	T	d	t
5			%	5	E	U	e	u			%	5	E	U	e	u
6			&	6	F	V	f	v			&	6	F	V	f	v
7	BEL		'	7	G	W	g	w	BEL		'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x	BS	CAN	(	8	H	X	h	x
9	HT		)	9	I	Y	i	y	HT		)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z	LF		*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
C	FF		,	<	L	\	l	|	FF		,	<	L	\	l	|
D	CR		-	=	M	]	m	}	CR		-	=	M	]	m	}
E	SO		.	>	N	^	n	~	SO		.	>	N	^	n	~
F	SI		/	?	O	_	o	DEL	SI		/	?	O	_	o	DEL

ASCII Code Chart printed in NLQ

Code Table (U.S.A.)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	*0*	*@*	*P*	*`*	*p*
1		DC1	!	1	A	Q	a	q		DC1	*!*	*1*	*A*	*Q*	*a*	*q*
2		DC2	"	2	B	R	b	r		DC2	*"*	*2*	*B*	*R*	*b*	*r*
3		DC3	#	3	C	S	c	s		DC3	*#*	*3*	*C*	*S*	*c*	*s*
4		DC4	$	4	D	T	d	t		DC4	*$*	*4*	*D*	*T*	*d*	*t*
5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*
6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*
7	BEL		'	7	G	W	g	w	BEL		*'*	*7*	*G*	*W*	*g*	*w*
8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*
9	HT		)	9	I	Y	i	y	HT		*)*	*9*	*I*	*Y*	*i*	*y*
A	LF		*	:	J	Z	j	z	LF		*	*:*	*J*	*Z*	*j*	*z*
B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	*;*	*K*	*[*	*k*	*{*
C	FF		,	<	L	\	l	¦	FF		,	*<*	*L*	**	*l*	*¦*
D	CR		-	=	M	]	m	}	CR		-	*=*	*M*	*]*	*m*	*}*
E	SO		.	>	N	^	n	~	SO		.	*>*	*N*	*^*	*n*	*~*
F	SI		/	?	O	_	o	DEL	SI		/	*?*	*O*	*_*	*o*	DEL

International Language Unique Symbols Chart printed in Draft quality

HEX	23H	24H	40H	5BH	5CH	5DH	5EH	60H	7BH	7CH	7DH	7EH
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	ç	é	^	ù	à	ò	è	ì
SPAIN	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

HEX	A3H	A4H	C0H	DBH	DCH	DDH	DEH	E0H	FBH	FCH	FDH	FEH
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	ç	é	^	ù	à	ò	è	ì
SPAIN	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

International Language Unique Symbols Chart printed in NLQ

HEX	23H	24H	40H	5BH	5CH	5DH	5EH	60H	7BH	7CH	7DH	7EH
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK1	#	$	É	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	$	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	ç	é	^	ù	à	ò	è	ì
SPAIN	Pt	$	@	¡	\	¿	^	`	{	|	}	~
JAPAN	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

HEX	A3H	A4H	C0H	DBH	DCH	DDH	DEH	E0H	FBH	FCH	FDH	FEH
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK1	#	$	É	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	$	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	ç	é	^	ù	à	ò	è	ì
SPAIN	Pt	$	@	¡	\	¿	^	`	{	|	}	~
JAPAN	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

APPENDIX H
CODE CONVERSION TABLE

Decimal	Hexa-decimal	Binary	ASCII Character
0	00	00000000	(NUL)
1	01	00000001	
2	02	00000010	
3	03	00000011	
4	04	00000100	
5	05	00000101	
6	06	00000110	
7	07	00000111	(BEL)
8	08	00001000	(BS)
9	09	00001001	(HT)
10	0A	00001010	(LF)
11	0B	00001011	(VT)
12	0C	00001100	(FF)
13	0D	00001101	(CR)
14	0E	00001110	(SO)
15	0F	00001111	(SI)
16	10	00010000	
17	11	00010001	(DC1)
18	12	00010010	(DC2)
19	13	00010011	(DC3)
20	14	00010100	(DC4)
21	15	00010101	
22	16	00010110	
23	17	00010111	
24	18	00011000	(CAN)
25	19	00011001	
26	1A	00011010	
27	1B	00011011	(ESC)
28	1C	00011100	
29	1D	00011101	
30	1E	00011110	
31	1F	00011111	
32	20	00100000	(SP)
33	21	00100001	!
34	22	00100010	"

Decimal	Hexa-decimal	Binary	ASCII Character
35	23	00100011	#
36	24	00100100	$
37	25	00100101	%
38	26	00100110	&
39	27	00100111	'
40	28	00101000	(
41	29	00101001	)
42	2A	00101010	*
43	2B	00101011	+
44	2C	00101100	,
45	2D	00101101	-
46	2E	00101110	.
47	2F	00101111	/
48	30	00110000	0
49	31	00110001	1
50	32	00110010	2
51	33	00110011	3
52	34	00110100	4
53	35	00110101	5
54	36	00110110	6
55	37	00110111	7
56	38	00111000	8
57	39	00111001	9
58	3A	00111010	:
59	3B	00111011	;
60	3C	00111100	<
61	3D	00111101	=
62	3E	00111110	>
63	3F	00111111	?
64	40	01000000	@
65	41	01000001	A
66	42	01000010	B
67	43	01000011	C
68	44	01000100	D
69	45	01000101	E
70	46	01000110	F
71	47	01000111	G
72	48	01001000	H
73	49	01001001	I
74	4A	01001010	J

Decimal	Hexa-decimal	Binary	ASCII Character
75	4B	01001011	K
76	4C	01001100	L
77	4D	01001101	M
78	4E	01001110	N
79	4F	01001111	O
80	50	01010000	P
81	51	01010001	Q
82	52	01010010	R
83	53	01010011	S
84	54	01010100	T
85	55	01010101	U
86	56	01010110	V
87	57	01010111	W
88	58	01011000	X
89	59	01011001	Y
90	5A	01011010	Z
91	5B	01011011	[
92	5C	01011100	\
93	5D	01011101	]
94	5E	01011110	^
95	5F	01011111	_
96	60	01100000	`
97	61	01100001	a
98	62	01100010	b
99	63	01100011	c
100	64	01100100	d
101	65	01100101	e
102	66	01100110	f
103	67	01100111	g
104	68	01101000	h
105	69	01101001	i
106	6A	01101010	j
107	6B	01101011	k
108	6C	01101100	l
109	6D	01101101	m
110	6E	01101110	n
111	6F	01101111	o
112	70	01110000	p
113	71	01110001	q
114	72	01110010	r

Decimal	Hexa-decimal	Binary	ASCII Character
115	73	01110011	s
116	74	01110100	t
117	75	01110101	u
118	76	01110110	v
119	77	01110111	w
120	78	01111000	x
121	79	01111001	y
122	7A	01111010	z
123	7B	01111011	{
124	7C	01111100	|
125	7D	01111101	}
126	7E	01111110	~
127	7F	01111111	(DEL)
128	80	10000000	(NUL)
129	81	10000001	
130	82	10000010	
131	83	10000011	
132	84	10000100	
133	85	10000101	
134	86	10000110	
135	87	10000111	(BEL)
136	88	10001000	(BS)
137	89	10001001	(HT)
138	8A	10001010	(LF)
139	8B	10001011	(VT)
140	8C	10001100	(FF)
141	8D	10001101	(CR)
142	8E	10001110	(SO)
143	8F	10001111	(SI)
144	90	10010000	
145	91	10010001	(DC1)
146	92	10010010	(DC2)
147	93	10010011	(DC3)
148	94	10010100	(DC4)
149	95	10010101	
150	96	10010110	
151	97	10010111	
152	98	10011000	(CAN)
153	99	10011001	
154	9A	10011010	

Decimal	Hexa-decimal	Binary	ASCII Character
155	9B	10011011	(ESC)
156	9C	10011100	
157	9D	10011101	
158	9E	10011110	
159	9F	10011111	
160	A0	10100000	(SP)
161	A1	10100001	!
162	A2	10100010	"
163	A3	10100011	#
164	A4	10100100	$
165	A5	10100101	%
166	A6	10100110	&
167	A7	10100111	'
168	A8	10101000	(
169	A9	10101001	)
170	AA	10101010	*
171	AB	10101011	+
172	AC	10101100	,
173	AD	10101101	-
174	AE	10101110	.
175	AF	10101111	/
176	B0	10110000	0
177	B1	10110001	1
178	B2	10110010	2
179	B3	10110011	3
180	B4	10110100	4
181	B5	10110101	5
182	B6	10110110	6
183	B7	10110111	7
184	B8	10111000	8
185	B9	10111001	9
186	BA	10111010	:
187	BB	10111011	;
188	BC	10111100	<
189	BD	10111101	=
190	BE	10111110	>
191	BF	10111111	?
192	C0	11000000	@
193	C1	11000001	A
194	C2	11000010	B

Decimal	Hexa-decimal	Binary	ASCII Character
195	C3	11000011	C
196	C4	11000100	D
197	C5	11000101	E
198	C6	11000110	F
199	C7	11000111	G
200	C8	11001000	H
201	C9	11001001	I
202	CA	11001010	J
203	CB	11001011	K
204	CC	11001100	L
205	CD	11001101	M
206	CE	11001110	N
207	CF	11001111	O
208	D0	11010000	P
209	D1	11010001	Q
210	D2	11010010	R
211	D3	11010011	S
212	D4	11010100	T
213	D5	11010101	U
214	D6	11010110	V
215	D7	11010111	W
216	D8	11011000	X
217	D9	11011001	Y
218	DA	11011010	Z
219	DB	11011011	[
220	DC	11011100	\
221	DD	11011101	]
222	DE	11011110	^
223	DF	11011111	_
224	E0	11100000	`
225	E1	11100001	a
226	E2	11100010	b
227	E3	11100011	c
228	E4	11100100	d
229	E5	11100101	e
230	E6	11100110	f
231	E7	11100111	g
232	E8	11101000	h
233	E9	11101001	i
234	EA	11101010	j

Decimal	Hexa-decimal	Binary	ASCII Character
235	EB	11101011	k
236	EC	11101100	l
237	ED	11101101	m
238	EE	11101110	n
239	EF	11101111	o
240	F0	11110000	p
241	F1	11110001	q
242	F2	11110010	r
243	F3	11110011	s
244	F4	11110100	t
245	F5	11110101	u
246	F6	11110110	v
247	F7	11110111	w
248	F8	11111000	x
249	F9	11111001	y
250	FA	11111010	z
251	FB	11111011	{
252	FC	11111100	¦
253	FD	11111101	}
254	FE	11111110	~
255	FF	11111111	(DEL)

APPENDIX I
PAPER SPECIFICATIONS

I.1 PAPER TYPES AND SIZES

The types and sizes of paper that can be used in this printer are listed in **Table I.1**.

Table I-1 Paper Types and Sizes

	Types	Sizes
80-column printer	Continuous	Width 4 inches (101.6 mm) to 10.5 inches (266.7 mm)
	Cut Sheet	Width 100 to 257 mm Length 76 to 364 mm
136-column printer	Continuous	Width 4 inches (101.6 mm) to 16.5 inches (419.1 mm)
	Cut Sheet	Width 100 to 420 mm Length 76 to 364 mm

I.2 PRINT AREAS

Print areas on continuous forms and cut sheet paper for the 80-column printer are shown in **Figures I-1** and **I-2** and print areas for the 136-column printer are shown in **Figures I-3** and **I-4**.

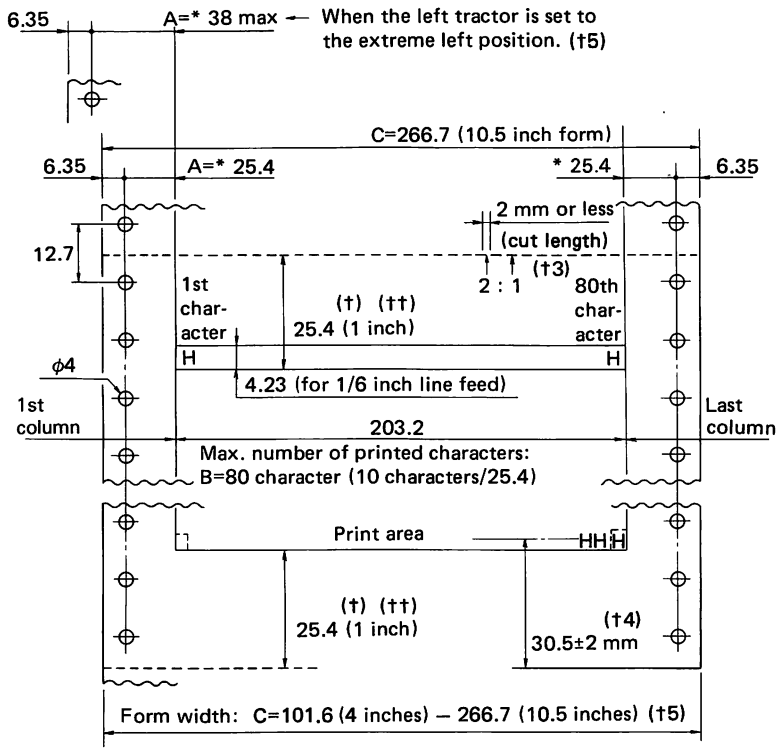


Figure I-1 Print Area on Continuous Forms (for the 80-column printer)

Notes: (1) Units used in the figure are mm. For the sizes marked *, tolerance is ±2.5 mm.

(2) Note that "Out-of-paper" may be detected if printing is done on paper already having dark printing or lettering other than standard lines or frames within 24/25 characters from the left edge.

† **If the printed form is to be cut into single sheets, leave a margin of 25.4 mm (1 inch) from the perforations.**

†† Since there is a possibility of line displacement near perforations, leave a margin of over 25.4 mm (1 inch) from the perforations.

†3 The cut/un-cut ratio on the perforated line is 2:1.

†4 The paper end detection switch is activated when the distance from the lower edge of the paper to the printing line center is 30.5±2 mm.

†5 There are restrictions on the initial print position for forms wider than 9.5 inches.

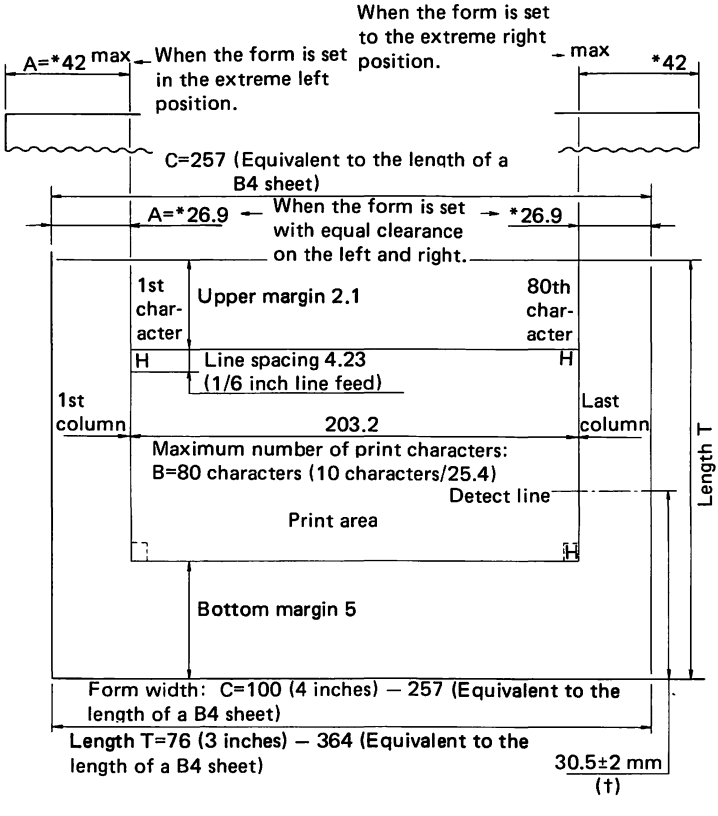


Figure I-2 Print Area on Cut Sheet Paper (for the 80-column printer)

Notes: (1) Units used in the figure are mm. For the sizes marked *, tolerance is ±2.5 mm.

(2) If the cut sheet form has horizontal ruled lines, it is difficult to align the lines when setting the form. Therefore, unruled forms are recommended.

(3) Note that "Out-of-paper" may be detected if printing is done on paper already having dark printing or lettering other than standard lines or frames within 24/25 characters from the left edge.

† The paper end detection switch is activated when the distance from the lower edge of the form to the printing line center is 30.5 ± 2 mm.

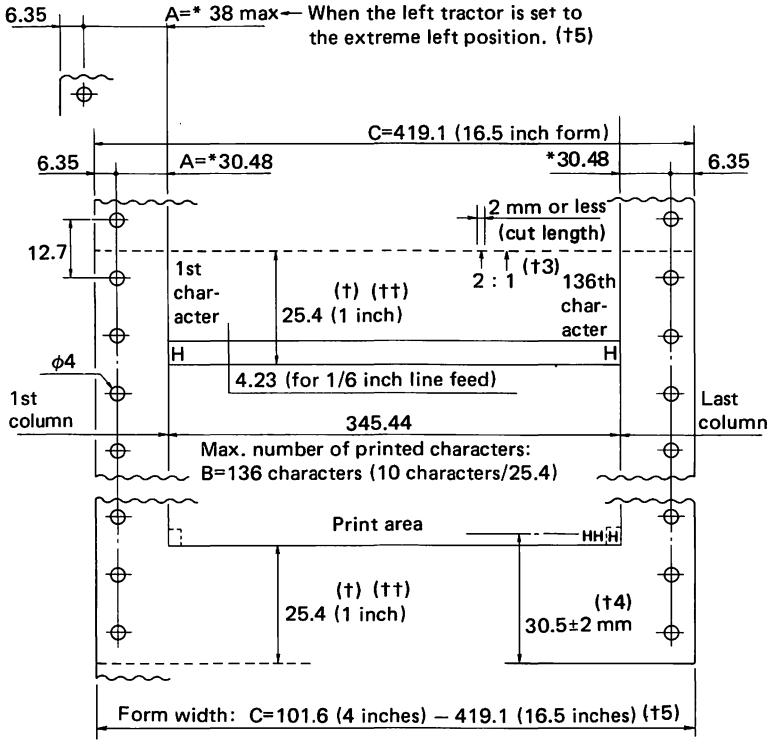


Figure I-3 Print Area on Continuous Forms (for the 136-column printer)

Notes: (1) Units used in the figure are mm. For the sizes marked *, tolerance is ±2.5 mm.

(2) Note that "Out-of-paper" may be detected if printing is done on paper already having dark printing or lettering other than standard lines or frames within 24/25 characters from the left edge.

† If the printed form is to be cut into single sheets, leave a margin of 25.4 mm (1 inch) from the perforations.

†† Since there is a possibility of line displacement near perforations, leave a margin of over 25.4 mm (1 inch) from the perforations.

†3 The cut/un-cut ratio on the perforated line is 2:1.

†4 The paper end detection switch is activated when the distance from the lower edge of the paper to the printing line center is 30.5 ±2 mm.

†5 There are restrictions on the initial print position for forms wider than 15 inches.

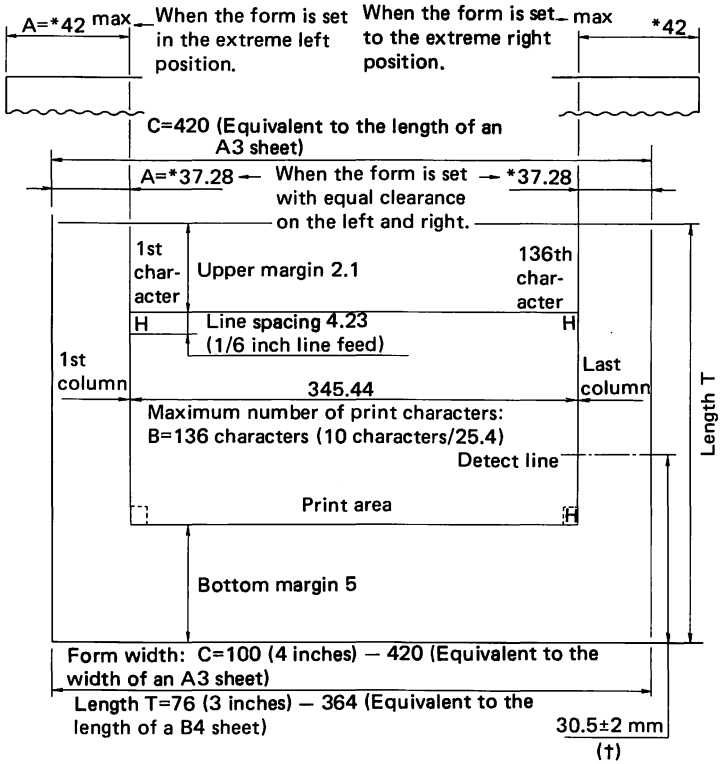


Figure I-4 Print Area on Cut Sheet Paper (for the 136-column printer)

Notes: (1) Units used in the figure are mm. For the sizes marked *, tolerance is ±2.5 mm.

(2) If the cut sheet form has horizontal ruled lines, it is difficult to align the lines when setting the form. Therefore, unruled forms are recommended.

(3) Note that "Out-of-paper" may be detected if printing is done on paper already having dark printing or lettering other than standard lines or frames within 24/25 characters from the left edge.

† The paper end detection switch is activated when the distance from the lower edge of the form to the printing line center is 30.5 ± 2 mm.

I.3 NUMBER OF COPIES AND BINDING FORMS

Follow the descriptions below to copy continuous forms and cut sheet paper and to bind them.

I.3.1 Number of Copies for Continuous Forms

Paper types and number of copes are a follows:

Number of copies	Form thickness (g/m^2)	Condition
3	40, 52, 64	Only the bottom copy can be the 52 or 64 g/m^2 type.
2	52, 64, 81	Only the bottom copy can be the 81 g/m^2 type.
1	52, 64, 81	

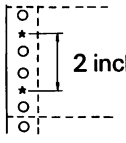
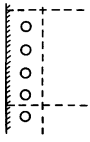
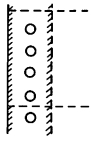
Notes:

(1) The number of copies includes the original.
(2) For copies, use carbon coated or NCR forms.
(3) If carbon paper is inserted between forms, the carbon paper is counted as one sheet. Therefore, the number of sheets of carbon paper that are inserted will have to be subtracted from the nubmer of copies.
(4) Total thickness must be 0.28 mm or less.

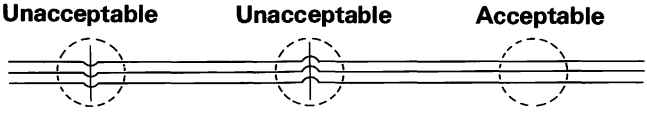
I.3.2 Binding Forms for Continuous Forms

When making multipart continuous forms, forms that have adhesive on both sides are recommended.

Several methods of gluing can be used; however, the forms on which adhesive is used at alternate points on each copy is recommended.

	Spot adhesive	Line adhesive	
		1 line	2 lines
Illustration			
Evaluation	Good	Acceptable	
Remarks	— Adhesive intervals should be 2 inches or less. — Adhesive spots should be as close to the perforations as possible. — Adhesive spots should be as small as possible and be at alternate positions on each copy.		

In the figure above, only one side of the form is shown. Make sure that there are no bulges along the perforated line, as shown in the following figure, after the forms have been bound together.



Notes:

(1) Metal or paper staples are likely to cause print displacement and feed problems. Use of staples should be avoided.
(2) Use forms having a tractor hole alignment tolerance of 0.4 mm or less.

I.3.3 Number of Copies for Cut Sheet Paper

The number of copies and types of forms are as follows:

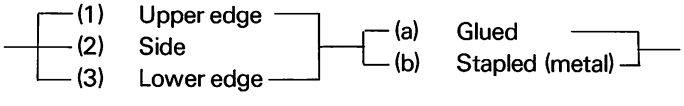
Number of copies	Form thickness (g/m^2)	Condition
3	40, 52, 64	Two copies of 40 g/m^2 type with 64 or 52 g/m^2 type as the bottom copy
2	40, 52, 64, 81	One copy of 40 or 52 g/m^2 type and 64 or 81 g/m^2 type as the bottom copy
1	52, 64, 81	

Notes:

(1) The number of copies indicated above includes the original.
(2) For copying, use carbon coated or NCR forms.
(3) Do not insert carbon paper between forms.
(4) Total thickness must be 0.28 mm or less.

I.3.4 Binding Forms for Cut Sheet Paper

Generally, cut sheet paper are bound together as follows:



The standard for this printer is upper edge (1)/glued (a) forms.

I.4 OTHER PRECAUTIONS

Use high-quality type paper forms.

Make sure that cut sheet paper is not curled.

Handle and store forms carefully. Make sure that they are not deformed or damaged.

APPENDIX J
GLOSSARY OF TERMS

AC Line Fuse:

Protects the printer's power supply in case of a power overload or short circuit.

AC Power Cord:

Provides electricity to the printer (two prongs for power and one plug for ground).

Application Software:

Program that provides a solution to a particular problem such as maintaining an inventory or creating a report.

ASCII:

An acronym for American Standard Code for Information Interchange, or the code sent to the printer with a unique binary coded number for each character.

Bail Roller Unit:

A unit consisted of a movable bar with three rollers, used to hold the paper against the Platen.

Baud Rate:

The speed of data transmission to the printer. Applies to serial data only. Baud rate is equal to the number of bits transmitted per second.

Bidirectional Printing:

The ability to print from left to right and then right to left to avoid carriage returns and increase printed output.

Bit:

A bit is the smallest unit of data and has a value of 0 or 1.

Bold Print:

Multi-strike printing that darkens the letter without increased line thickness.

Buffer:

Storage area for incoming data.

Byte:

Eight bits that are considered as one symbol. Used to represent a single character such as a number, a letter, or a special control character.

Card Guide:

Used to help position paper. Horizontal lines indicate the position.

Carriage Return:

The return of the print head to the beginning of the next line.

Character:

Any letter, number, or symbol.

Command:

An instruction that tells the computer what to do. A command usually consists of words, parts of words, or codes. The computer will only respond to those commands that are accepted by the program which the computer is currently running.

Command Set:

The series of print or format instructions imbedded in the printer firmware, and actuated by codes sent from the host computer.

Continuous Form:

Another word for continuous fanfolded sheets of paper at perforation, with punched holes for tractor feeding.

Data:

Another word for information.

Default:

A printer parameter that the printer returns to power on state.

DIP Switch:

"Dual in-line package" switch, these switches found in groups, provide the operator with control of the printing default settings.

Escape Code:

A sequence of characters, beginning with ESCAPE(ESC) that make up a command to the printer.

Font:

A complete set of type in one size and style of characters.

Form Feed:

A signal to the printer to advance the printer Platen until the next top-of-form position is reached.

Form Length:

A printer setting for the spacing between top-of-form positions measured in inches.

Format:

The shape and appearance of printer output, including page size, character width and spacing, line spacing, etc.

Friction Feed:

Feeding of paper through the printer is accomplished by the friction between the Platen and pressure rollers.

Interface:

The connection that transfers electrical signals from one part of a system to another.

Line Spacing:

The vertical spacing between lines, measured in lines per inch.

Matrix:

An array of elements; in the case of printers the arrangement of the pins that form the letters through closely spaced dots.

Platen:

The rubber roller in the printer, which provides a backing for the printing action.

Power Switch:

The system's ON/OFF switch located on the rear of the printer unit. This switch is labeled with the international designations 1 for ON and 0 for OFF.

Proportional Spacing:

Character width differs from one character to another. These characters require variable printhead spacing (proportional).

Reset:

A function performed by turning printer OFF and then ON again.

Top-of-Form:

The very top of a page of text.

Tractor Feed:

A paper handling device for continuous forms. The tractor sprockets engage holes in the edge strip of the form, guiding and registering the paper.

FOR UNITED STATES USERS

FEDERAL COMMUNICATIONS COMMISION
RADIO FREQUENCY INTERFERENCE STATEMENT

WARNING: This equipment complies with the limits for a Class B Computing Device in accordance with the specifications in Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against radio and television interference in residential installations. There is, however, no guarantee that interference will not occur in any particular installation.

If equipment certified to meet Class B limits does cause interference to radio or television reception, which can be determined by turning the equipment Off and On, the user is encouraged to try to correct the interference by one or more of the following measures:

(a) Reorient the radio or television receiving antenna.

(b) Relocate the printer with respect to the receiver.

(c) Move the equipment away from the receiver.

(d) Plug the printer into a different power outlet, so the printer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. An FCC booklet, "How to Identify and Resolve Radio-TV Interference Problems," Stock No. 004-000-00345-4, is also available from the U.S. Government Printing Office, Washington, D.C. 20402.

In equipment labeled FCC Class B compliant, a shielded and grounded I/O cable is necessary to achieve compliance with the FCC Rules regarding radio emissions from computers. Please consult with your dealer for further details regarding this cable.

FOR GERMAN USERS

Dieses Gerät entspricht als Einzelgerät den Funkentstörungsanforderungen der Postverfügung Nr. 1046/1984 bzw. der Grenzfläche B nach VDE 0871/6.78.